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American Foundryman

A PUBLICATION PRESENTING ASSOCIATION AND CHAPTER ACTIVITIES

Exhausting dust from swing frame grinders *(Courtesy Monroe Steel Castings Co.)*

Chemical Analysis for Iron and Steel, See Page 2. Changing the Properties of Sand, See Page 9. 1944 Congress, See Page 13. Chapter Lecture Courses, See Pages 15, 32. How to Buy Castings, See Page 16. Safety and Hygiene Code, Page 19.

January 1944

Steel Foundries' Contribution of Major Help in War Effort

NO material has been used more extensively in the war effort, and no heavier emergency demands have been made than those imposed upon the producers of steel and steel products.

When it is recognized that a large majority of the instruments of war are constructed entirely of steel or require steel in many of their components, the reason for these heavy demands is obvious. Superimposed on this is the large tonnage of steel required in processing equipment.

Due to the substantial progress made by the Steel branch of the Foundry Industry in the development of quality castings during the last decade, steel casting producers were in an excellent position to meet the demands placed upon them. By furnishing large tonnages of a great variety of castings, they released wrought steel, as well as hammers, presses and machine tools, when the shortage of these facilities was critical.

The transition of the steel foundries from normal peace-time operation to a war-time basis has been an excellent example of the flexibility of the Foundry Industry. Facilities for making castings for use in railroads, excavating machinery, dredges and crushers had to be converted to produce turrets and other parts for combat tanks, gun mounts and shields, breech rings, trench mortar barrels and aircraft landing gear parts.

The development and production of these castings were not permitted to interfere with production of valves and fittings, turbine and pump castings, struts and other structural castings, required in progressively increasing quantities for Naval and Maritime construction.

It is indeed a tribute to the steel foundries that they were able to manufacture castings that performed satisfactorily under more severe service conditions than ever before even considered for cast steel, and in many instances the performance has been superior to parts made by other methods.

The resourcefulness of the steel foundries of the country, in converting from peace-time to war production, has been a major contribution to the war effort. Full appreciation of what has been done probably will not be general until after the war, since details concerning the activities of this industry might give aid and comfort to the enemy. However, the enemy certainly will receive neither aid nor comfort from the equipment in which these castings are now being used.

The Steel Division Technical committees of the American Foundrymen's Association have been of considerable assistance to the steel foundries of the country in this war period, by providing the opportunity for free interchange of information on shop practice and metallurgical control. These committees have focused their attention on the most difficult problems and have assembled information on how they might be solved.

Through the medium of technical papers and committee reports, they have made available knowledge on the latest developments in the steel casting field. While many of these developments have resulted from demands imposed by war, their full benefits will be enjoyed when the country returns to peace-time pursuits, for the steel foundries then will be in a position to offer castings for applications never before open to them.

T. N. Armstrong

T. N. ARMSTRONG. *Chairman.*
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Entered as second class matter July 22, 1938, at the post office at Chicago, Illinois, under the Act of March 3,1879.

This article, describing a combined chemical analysis routine for plain and alloyed cast iron, malleable iron and steel, has resulted in time saving for completing a number of determinations, as well as in the handling and weighing operations of the sample itself. Material saving is realized in the amount of the initial sample required, together with less chemicals and filter papers. The author points out that less standard equipment and workroom space are needed for this type of analysis, which involves only a comparatively short training period for inexperienced laboratory assistants.

A Combined Method of Chemical Analysis for Cast Iron, Malleable Iron and Steel

By Winfield B. Sobers

Development and Control Laboratories, Chain Belt Co., Milwaukee, Wis.

TODAY any method of analysis requiring less time and chemicals is a great value in any laboratory. Compared to other routine methods which require a single weighing of sample for each determination, where checks for chromium, nickel, molybdenum, manganese and silicon are necessary, a combined method of analysis has many definite advantages.

These benefits include reduction in cost per determination, time on the hot plate, and volume of distilled water used. In the combined method, a saving of filter papers also is noted when working with irons containing free carbons.

A combined method of analysis, developed in the plant with which the author is associated, is outlined in the following paragraphs. The method is designed for the routine determination of silicon, manganese, phosphorus, chromium, nickel and molybdenum on a single weighing of sample of either plain or alloyed hard iron, malleable iron, gray iron, pig iron or steel.

Assistant at work in the Chain Belt Company's well equipped laboratory.

Advantages of Method

After evaporating the sample to dryness, it is filtered free of silicon, catching filtrate into a volumetric flask. Aliquot parts are drawn off for the determinations involved, depending on initial weight of sample, volume and per cent element involved. Variations as to combination of elements determined will be influenced by each individual circumstance.

The author has found this method to be very satisfactory for checking low and medium alloy steels. It lends itself readily for checking all the NE grades or any other type where checks for silicon, manganese, chromium, nickel, and molybdenum are required.

Since the plant also operates gray iron and malleable iron foundries, the combined method of analysis is applied in iron analysis. Each day several bars are checked for silicon, manganese and phosphorus, and other bars are checked for silicon, manganese, phosphorus and chromium.

Some advantages of the combined method of analysis are:

1. Less time required to complete a number of determinations.
2. Less initial sample required.
3. Less weighing time and handling of sample.
4. Less glassware involved at balance.
5. Less hot plate room and less work required to handle samples.
6. Less chemicals and filter papers required.
7. Less training involved for an inexperienced person to adapt himself.

Determination of Silicon, Manganese and Phosphorus in Unalloyed Hard Iron, Malleable Iron, Gray Iron, Pig Iron and Steel

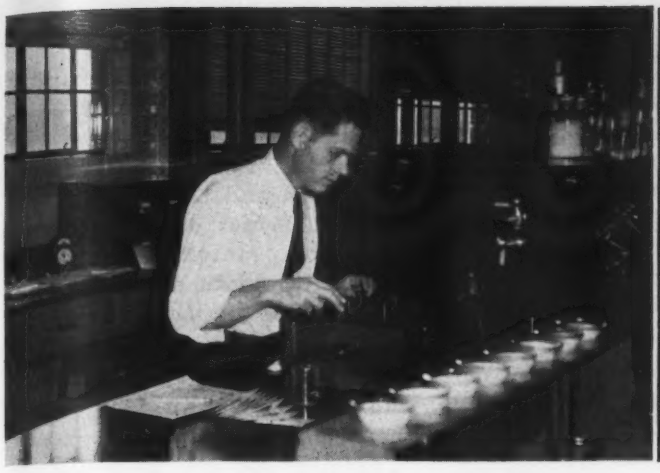
Weigh 1.2 grams of sample into a 150 ml. beaker. Add 5 ml. of dilute HNO_3 (1-1) and 20 ml. of perchloric acid (70-72 per cent C.P.). Cover beaker with a watch glass and evaporate to just short of dryness or to the point where the salts will immediately solidify on removing from the hot plate.

Add exactly 5 ml. of HNO_3 (conc.) and approximately 30 ml. of hot water. Digest a min. or two until soluble salts are dissolved. Dilute to approximately 60 ml. Filter at once into a 100 ml. volumetric flask.

Wash the beaker with two or three washings of hot water (do not scrub beaker free of silicic acid at this point). Wash paper with three or four washings of hot water. Remove volumetric flask from under funnel and dilute to mark. Transfer to a dry 300 ml. erlenmeyer flask. From a burette, add 20 ml. of water to the volumetric flask. Shake and add this to the 300 ml. erlenmeyer flask. Total volume is now 120 ml. (1 ml. = 0.0100 gram).

Silicon

Scrub the 150 ml. beaker free of silicic acid and wash onto paper on which original solution was filtered. Wash the residue on the paper three or four



The author engaged in colorimetric determination.

Laboratory assistant pipetting aliquot portions.

times with hot HCl (1-10) followed by four or five washings with hot water. Ignite and weigh as SiO_2.

$$\frac{SiO_2 \times 46.72}{\text{Wt. of sample}} = \text{per cent Silicon}$$

Manganese

From the solution in the erlenmeyer flask, which has been thoroughly mixed, pipette out 20 ml. of solution and transfer to a 250 ml. erlenmeyer flask. Add 10 ml. of silver nitrate solution and approximately 60 ml. of H_2O. Bring to a boil.

Boil 2 min. and then add 20 ml. of a 10 per cent solution of ammonium persulphate to the boiling solution. Digest at a warm heat until solution effervesces and then remove from heat. Adjust volume to approximately 100 ml. Cool to tap-water temperature and titrate with standard sodium arsenite solution. (1 ml. = 0.10 per cent manganese on a 0.2 gram sample.)

Phosphorus

To the remaining 100 ml. volume, add exactly 5 ml. HNO_3 (conc.). Then, while rotating the flask slowly, add 5 ml. of ammonium hydroxide (conc.). Adjust temperature, if necessary, to approximately 100° F., and add 50 ml. of molybdic acid solution. Shake the flask for 5 min., either by hand or by mechanical means to complete precipitation.

If by hand, shake by rotating the flask in one direction, and then in the other. If several determinations are being run at the same time, alternate the shaking from flask to flask so that each of the flasks has an equal amount of agitation over a period of 5 min. Allow precipitate to set for 10 or 15 min. and shake for 5 min. more. Allow to set at least 15 min. and filter.

If the phosphorus content is low, as in steel, shake first for 5 min., then set 30 min., and shake 5 min. more, allowing precipitate to set from one to four hr., depending on amount of phosphorus present, and filter.

Wash flask and paper twice with nitric acid wash solution; wash flask three times with potassium nitrate; wash solution and the paper 8 to 10 times with the same solution, or until the washings are free of acid.

Put paper and precipitate into flask; add about 130 ml. of H_2O and 2 to 5 ml. excess of standard NaOH solution; shake thoroughly. Add 2 or 3 drops of phenolphthalein solution and let stand for at least 5 min.

Back titrate excess standard NaOH with standard HNO_3 solution to the disappearance of the pink color. If the solutions are equivalent, subtract the ml. of acid from the ml. of alkali to find ml. of standard NaOH actually needed, and multiply by the phosphorus titer of the alkaline solution.

Plain Carbon Steel

For plain carbon steel, weigh a 2.2 gram sample into a 150 ml. beaker and treat with 5 ml. of dilute nitric acid (1-1) and 30 ml. perchloric acid. Treat as outlined above, but dilute to 110 ml. (1 ml. = 0.0200 grams). From the erlenmeyer flask, pipette out 10 ml. of solution for manganese and use the remaining 100 ml. for the phosphorus determination. Determine silicon, manganese and phosphorus as outlined previously.

Determination of Silicon, Manganese, Chromium, Nickel and Molybdenum in Alloyed Hard Iron, Gray Iron, Malleable Iron and Steel

Weigh a 1.3 gram sample into a 150 ml. beaker. Add 5 ml. of dilute HNO_3 (1-1) and 20 ml. of perchloric acid (70-72 percent C.P.).

Evaporate to just short of dryness and treat as outlined under unalloyed iron, with the exception that 2 ml. of nitric acid (conc.) is used in place of 5 ml. to dissolve the soluble salts. Filter, catching filtrate in a 100 ml. volumetric flask. Wash beaker and paper with hot water.

Dilute to mark and transfer to a dry 400 ml. beaker. Flush out volumetric flask with 30 ml. of water. The volume is now 130 ml. (1 ml. = 0.0100 grams).

Silicon

If silicon is desired, finish as outlined under unalloyed irons.

Manganese

From the beaker, pipette out 20 ml. of solution and transfer to a 250 ml. erlenmeyer flask. Finish as outlined under unalloyed irons.

Molybdenum

From the beaker, pipette out 10 ml. of solution and transfer to a 150 ml. beaker. Add 15 ml. of HCl (conc.) and dilute with

water to 50 ml. Cool and transfer to a 200 ml. separatory funnel.

Rinse beaker with 10 ml. of sodium or potassium thiocyanate solution, adding same to funnel. Add 25 ml. stannous chloride solution and shake thoroughly for one min. Add exactly 50 ml. of technical butyl acetate and shake for one min.

Allow acid layer to separate and then drain it off along with a few ml. of colored butyl acetate. Transfer some of the orange colored butyl acetate solution to a suitable tube and check with a spectrophotometer, photelometer, colorimeter or by direct color comparison.

Chromium

Dilute the remaining 100 ml. of solution to 150 ml. and cool. Titrate with ferrous ammonium sulphate solution using 2 to 5 ml. in excess, and back titrate with potassium permanganate solution or finish by potentiometric titration.

Nickel

To the reduced chromium solution add 10 ml. HCl (conc.) and 25 ml. of a 25 per cent solution of citric acid. Neutralize the solution with ammonium hydroxide (conc.) adding 1.0 ml. in excess. Add 2 or 3 drops of aerosol (wetting agent) to prevent nickel glyoxime precipitate from creeping; cool to room temperature or lower, and precipitate the nickel while stirring rigorously with a 1 per cent alcoholic solution composed of dimethylglyoxime.

If nickel content is low, rub inside of beaker with glass rod to start precipitation. Allow precipitate to set for 30 min. or longer, depending on amount of nickel present. Filter and weigh as nickel glyoxime, or the precipitate may be ignited to the oxide NiO.

Phosphorus

If phosphorus is desired in a chromium, nickel, molybdenum alloy iron and the material contains 0.100 per cent phosphorus or higher, weigh 2.3 grams of sample into a 250 ml. beaker; add 5 ml. dilute nitric acid (1-1) and 30 ml. perchloric acid, and treat as outlined under alloy irons.

Dilute to 230 ml. in a 400 ml. beaker (1 ml. = 0.0100 grams). Transfer 100 ml. to a 300 ml. erlenmeyer flask and finish as outlined for phosphorus under unalloyed iron and steel. Use the remaining 130 ml. for chromium, nickel, molybdenum, manganese, as outlined. Check against a Bureau of Standards cast iron standard alloy sample No. 107 containing nickel, chromium, molybdenum.

For alloy material low in phosphorus, determine phosphorus on a separate sample.

Notes on Conducting Analysis

When the treated sample is being evaporated to just short of dryness (approximately 20 min.) and the separated salts tend to darken instead of remaining orange or white, depending on the amount of chromium present, add approximately 1.0 ml. more of perchloric acid and continue evaporation at a lower temperature to short of dryness.

For alloy steels, a 2.3 gram sample may be used. After solution, dilute to 230 ml. and use 100 ml. each for chromium and nickel determinations. However, this method requires 10 ml. or 33 per cent more of critical perchloric acid per determination. For this reason, a smaller sample is preferable. Since the amount of silicon in all the AISI, NE, NAX and aeronautical steels is 0.20 per cent or more, a 1.3 gram sample should suffice for routine silicon determinations.

For the steels or irons containing more than 0.50 per cent molybdenum, use less initial sample or dilute the aliquot 10 ml. to 100 ml. and take suitable aliquot portions from this diluted volume. Use proportionately less stannous chloride and potassium

Table 1

STANDARD SOLUTIONS USED IN COMBINED ANALYSIS

SOLUTIONS

Potassium Thiocyanate
50 grams KCNS
1500 ml. Water

Standard Potassium Permanganate Solution
1.83 grams $KMnO_4$
1000 ml. H_2O

Silver Nitrate
5 grams $AgNO_3$
1500 ml. Water
500 ml. HNO_3

Molybdic Acid

Solution No. 1
575 grams Molybdic Acid (85 per cent)
400 ml. NH_4OH
200 ml. Water

Solution No. 2
2000 HNO_3
3000 ml. Water

Cool solutions and mix, adding No. 1 to solution No. 2. Add a pinch of microcosmic salt. Use decanted or clear solution.

Standard Ferrous Ammonium Sulphate Solution
25 grams $FeSO_4$ $(NH_4)_2SO_4 6H_2O$
950 ml. H_2O
50 ml. H_2SO_4

Standardize against a standard steel of known chromium content, 1.0 ml. —approx. 0.10 per cent chromium on the basis of a 1.0 gram sample.

Potassium Nitrate Wash Solution
10 grams KNO_3
1000 ml. H_2O

Standard Sodium Hydroxide
6.6 grams NaOH
1000 ml. H_2O

Standardize against a 2.0 gram sample of National Bureau of Standards standard sample No. 8e containing 0.100 per cent P. Adjust volume so that 1.0cc. is equivalent to 0.01 per cent P on the basis of a 2.0 gram sample.

Nitric Acid Wash Solution
10 ml. HNO_3
1000 ml. H_2O

Phenolphthalein Indicator
1.0 gram phenolphthalein
100 ml. alcohol

Stannous Chloride
112 grams $SnCl_2$
(dissolved in 100 ml. hot HCl conc.) dilute to 1000 ml.

Standard Sodium Arsenite Solution
36 grams Na_2CO_3
6.08 grams As_2O_3
1000 ml. H_2O (hot)

Boil, cool and dilute to 9000 ml. with H_2O. Standardize against a standard steel sample, adjust volume so that 1.0 ml.=0.10 per cent manganese on the basis of a 0.2 gram sample.

Standard Nitric Acid
9.5 ml. HNO_3
1000 ml. H_2O

The standard alkali having been standardized, the standard acid is adjusted so the solutions are of equal strength, 1.0 ml.=1.0 ml.

thiocyanate solution with the smaller weight samples.

By using a more dilute solution of thiocyanate in place of the generally used 5 per cent solution, no difficulties are encountered in reducing the pinkish-red color of ferric thiocyanate when molybdenum is present in small amounts.

If the manganese content is more than 1.20 per cent, adjust initial weight or aliquot portions to a 100 milligram sample, or use some phosphoric acid to insure complete oxidation of higher manganese irons.

Standards for Conducting Analysis

Equal weights (0.4333 grams) of National Bureau of Standards' standard samples Nos. 72b-chromium-molybdenum alloy, 111-nickel-molybdenum alloy and 100-manganese rail steel will give a satisfactory standard sample, having a silicon content of 0.258 per cent; manganese, 0.85 per cent; chromium, 0.47 per cent; nickel, 0.67 per cent; and molybdenum, 0.148 per cent. This will be similar to an NE type steel. Equal weights (0.65 grams) of samples Nos. 72b and 111 should be satisfactory. In any event, check standards of near similar composition under like conditions.

It is obvious that, if one has the necessary equipment, colorimetric methods may be developed to shorten the time still more, and that the combined method may be applied to higher alloy irons. For example, it may be applied to irons containing titanium and copper which could be determined by a suitable colorimetric method.

While the samples are being weighed or evaporated to dryness, advantage can be taken of this time to get the necessary glassware ready for the determinations to follow.

Conclusion

In closing, the aim has been to submit an economical and simplified method for routine chemical inspection, at the same time being conservative and taking full advantage of critical and costly perchloric acid by rationing a small volume to handle several determinations at one time.

A minimum of equipment is required in the combined method of chemical analysis.

References

Reference works should be consulted if more complete details are required. Those suggested are:

"Chemical Analysis of Alloy Steels," C. M. Johnson.

"Analysis of Iron and Steel," Lundell, Hoffman and Bright.

"Analysis of Carbon and Alloy Steels," Chemists, U. S. Steel Corp.

"Molybdenum Determination," G. M. Poole, *The Iron Age,* October 9, 1941.

For safety precautions to be observed in using perchloric acid, see *"Analysis of Carbon and Alloy Steels,"* Chemists, U. S. Steel Corp.

West Coast Visitors

THE Southern and Northern California Chapters, with headquarters at Los Angeles and San Francisco, respectively, extend to members of other chapters a cordial invitation to attend meetings of their chapters when visiting the West Coast. The chapter meeting schedule, which appears regularly on the inside back cover of *American Foundryman* gives the time and place of these meetings.

These chapters would welcome information from members as to proposed visits, for often opportunity to address the chapters as speakers on technical and shop practice subjects can be extended. The Association office wishes to learn of those who are planning to visit the West Coast so that it may assist in making arrangements with those willing to address the Southern and Northern California Chapters. Volunteers are requested to get in touch with the A.F.A. Secretary, 222 W. Adams St., Chicago.

Aim to Standardize Gray Iron Chill Tests

T. E. BARLOW, Vanadium Corp. of America, Detroit, will serve as chairman of the new A.F.A. Committee on Chill Tests, Gray Iron Div. The purpose of this group will be to study the existing methods of making the chill test, with the ultimate aim being standardization of the test, if possible.

The committee, in addition to Mr. Barlow, includes:

T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa.; K. Geist, Allis-Chalmers Mfg. Co., Milwaukee, Wis.; E. Janke, Nordberg Mfg. Co., Milwaukee, Wis.; D. E. Krause, Battelle Memorial Institute, Columbus, Ohio; D. E. Lehane, Westinghouse Electric & Mfg. Co., Trafford, Pa.; Wm. McFerrin, Cadillac Motor Car Co., Detroit; H. C. Winte, Worthington Pump & Machinery Co., Buffalo, N. Y.

The chill test is now widely recognized as a most valuable addition to the technique of cupola control in gray iron foundries. The sizes, shapes, and methods of pouring this test, however, are nearly as numerous as the foundries using the test.

Since any written or oral discussion of cupola practice even-

tually involves some reference to the chilling characteristics of cast iron, the lack of standardization of chill tests usually creates confusion. Some common measuring stick, therefore, is essential before foundrymen can conveniently exchange qualitative data on the effect of the various materials and practices on the chilling characteristics of their metal. It is with this idea in mind, that the Committee on Chill Tests is studying the existing methods for making tests to determine the advantages of each type.

This study will eventually develop into a recommendation for a standardized procedure, if such is indicated. It is the hope of the committee that those foundries using some method of measuring the chilling characteristics of gray iron will cooperate by contacting some member of the committee, to acquaint him with the details of the test.

Plans have been made to devote at least one session of the Gray Iron Shop Course at the 1944 Annual Meeting of A.F.A. to the subject of chill tests, so that as many ideas as possible may be included in the dicussion.

1944 Pre-Convention Issue

THE April 1944 issue will be the Pre-Convention Issue of "American Foundryman," and in accordance with the authorization of the A.F.A. Board of Directors as given last July will be issued "on the same basis as the 1943 Pre-Convention Issue." Thus the April number again will contain advertisements of firms whose products serve the Foundry Allied Industries in the production, processing, machining and finishing of castings.

First announcement of this issue, reproduced on this page, has already been mailed to advertisers in the 1943 issue, to 1944 Exhibitors whose space applications are already in, and to previous Exhibitors at A.F.A. Foundry Shows. The complete program of the 3d War Production Foundry Congress, to be held in Buffalo, April 25-28, will be printed in the Pre-Convention Issue, along with many interesting editorial features of interest to the industry.

Members of A.F.A. will recall the 1943 Pre-Convention Issue with its 248 pages as the first regular publication of the Association in which advertising was ever accepted. The April 1944 number will be finer in every way and, in addition to regular distribution to all A.F.A. members, will be distributed to a carefully selected list of several thousand additional top operating executives of U. S. and Canadian foundries. Its premanent value is acknowledged as a special directory of manufacturers and suppliers of materials for castings producers.

YES!

ADVERTISING will be ACCEPTED

IN THE

APRIL 1944 PRE-CONVENTION ISSUE

"AMERICAN FOUNDRYMAN"

The 1944 Pre-Convention Issue of American Foundryman, the official monthly publication of American Foundrymen's Association, has been authorized by the A.F.A. Board of Directors "on the same basis as the 1943 Pre-Convention Issue." That means:

1. The 1944 Pre-Convention Issue will be the April 1944 number.

2. It will be mailed early in April, well in advance of the 3rd War Production Foundry Congress and Foundry Show, to be held April 25-28 in Buffalo, N.Y

3. It will be read by every one of the over 6,000 members of A.F.A.—and by some 2,000 additional selected foundry executives in the U.S. and Canada. All copies will be personally mailed.

4. It will be bound in a striking full-color cover, and will equal or exceed in size the 248 pages of the 1943 Pre-Convention Issue.

5. It will contain the complete program of the 3rd War Production Foundry Congress.

6. It will contain up-to-the-minute editorial features of interest to all foundrymen, practical and technical articles on current foundry developments, important reports of A.F.A committee activities, news of Chapter activities throughout the country, etc.

7. It will include an extensive ADVERTISING SECTION for firms whose products serve in the production, machining and finishing of castings.

8. It will also include an extensive Buyers' Guide for the convenience of the 8,000 progressive foundrymen who receive the issue.

9. As with the 1943 Pre-Convention Issue, all advertisements will be confined to full pages and 2-page spreads, and no more than two pages to any one advertiser. No "special" or "preferred" positions.

10. Basic page rate (Black and White) for the 1944 Pre-Convention Issue will be $160.00 per page, $300.00 for 2-page spread. Color extra, $25.00 per color per page; bleed extra, $10.00 per form per page.

New Committee Appointed

DR. N. E. WOLDMAN, Chief Met. Engr., Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., Chairman, Aluminum and Magnesium Division of A.F.A., has appointed a committee, with himself as chairman, to act as a review committee for the sections of the *Cast Metals Handbook* dealing with aluminum and magnesium alloys. This committee will begin to function shortly after the issuance of the 1944 edition of the handbook. The committee is composed of the following individuals, in addition to Dr. Woldman:

H. J. Rowe, Aluminum Co. of America, Cleveland, Ohio—aluminum; W. A. Reich, General Electric Co., Schenectady, N. Y.—aluminum; L. Brown, Magnesium Fabricators Div., Bohn Aluminum and Brass Corp., Adrian, Mich.—magnesium; and C. E. Nelson, Dow Chemical Co., Midland, Mich.—magnesium.

This paper was presented at the Gray Iron Shop Course at the 1943 St. Louis Foundry Congress, and describes a melting practice employing a front slagging cupola spout which carries both the molten metal and the slag through the tap hole and into a trough. The separation is accomplished by the flow of the metal under a dam as the slag floats to the top and drains into a ladle. Maintenance cost for this design of cupola spout appears not to be out of line with costs for the standard type cupola.

Design of a Front Slagging Cupola Spout

By R. D. Petcher

Foundry Superintendent, Manufacturing Div., Weil-McLain Co., Michigan City, Ind.

AT THE request of the A.F.A. Cupola Research Committee, we are glad to present the details of a front slagging spout which has been used very successfully at our plant for some time. Like most front slagging spouts, both the molten metal and slag are carried together through the cupola breast or tap hole into a trough.

The metal then flows under a slag dam, while the slag floats on the metal and runs off at the side of the spout into a slag ladle. The clean metal then flows over the lip of the spout into a receiver from which it is distributed, by means of conventional transfer ladles, to the molding floors.

The dimensions in Fig. 1 are those of our own spout which is used on an 84-in. cupola shell lined to 66-in. It operates at approximately 18-oz. wind box pressure. This construction can be applied to any operation by proportioning it to suit a particular size cupola.

The distance between the top of the cupola breast or tap hole and the lip of the slag spout is critical. If it is too low for the wind box pressure, air will bubble out of the tap hole, and if it is too great the slag will not flow from the well of the cupola. The table of distance "X" and wind box pressure is taken from a paper by Reese[1].

Melting Practice

It is our practice to start melting with the cupola tap hole plugged. The slag spout drain hole is plugged with a round stock core. About 18 min. after "wind on," the cupola tap hole is opened and the metal flows continuously until the end of the heat. Melting can be stopped by simply shutting off the wind, and the slag spout will remain open for as long as 45 min. To shut down for longer periods, the slag spout drain hole should be opened, allowing the spout and cupola well to drain.

As the last iron in the stack melts, about 2000 lbs. of usable iron will remain in the cupola well and slag spout. This is tapped out by opening the cupola drain spout. When slag comes, the drain spout is lightly plugged.

In due course, the cupola bottom is dropped, after which the front of the drain spout is unlatched and swung to one side. The whole spout system then drains free of molten iron and slag.

The cost of daily maintenance in labor and materials is about the same as that of a standard cupola spout. The slag is easily chipped out, holes are filled with

[1] Reese, D. J., "Cupola Operation," *Transactions*, American Foundrymen's Association, vol. 46, pp. 173-194 (1938).

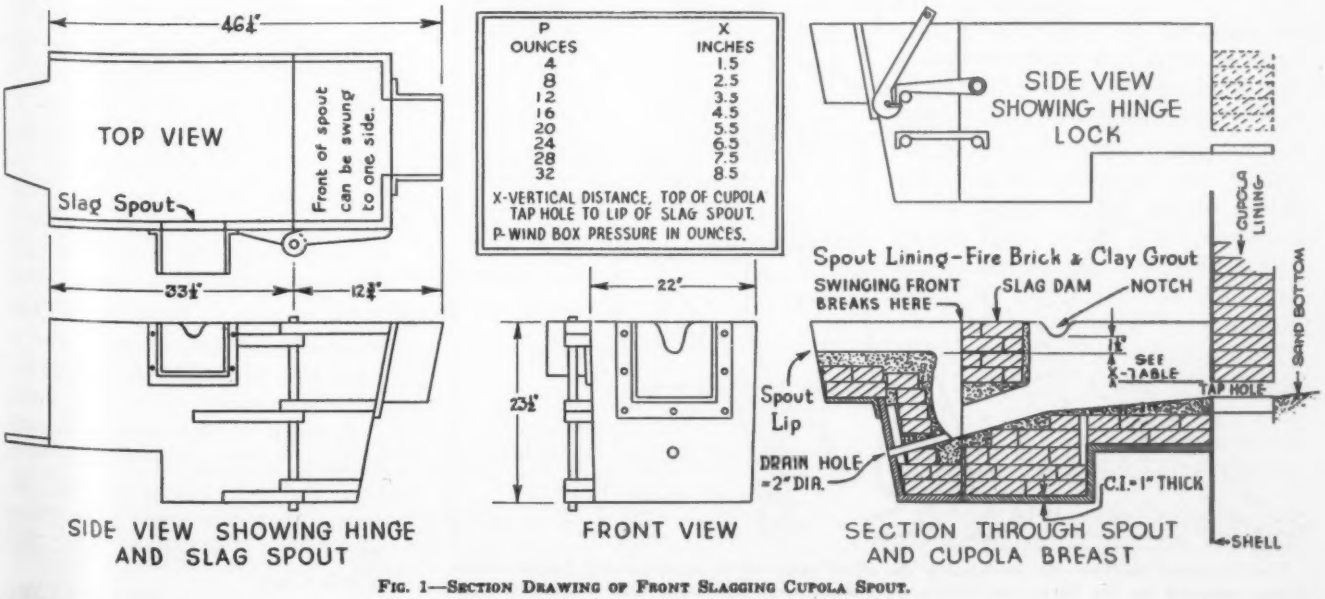


FIG. 1—SECTION DRAWING OF FRONT SLAGGING CUPOLA SPOUT.

the same grout mixture used to repair the cupola lining, and the spout is then washed with daubing clay and dried with either a torch or a wood fire. The whole spout, including the slag dam, is relined once in about 6 months.

In our opinion, the low maintenance is due to massive, rigid construction and large holes and passages that are easily cleaned. The spout is made of cast iron sections of ¾- to 1-in. thickness, is very rigidly supported by the cupola frame at one end and is rigidly suspended from a steel building truss at the other end. Heavy lateral tie rods at the front end prevent side sway.

Easing the Job For Women Molders

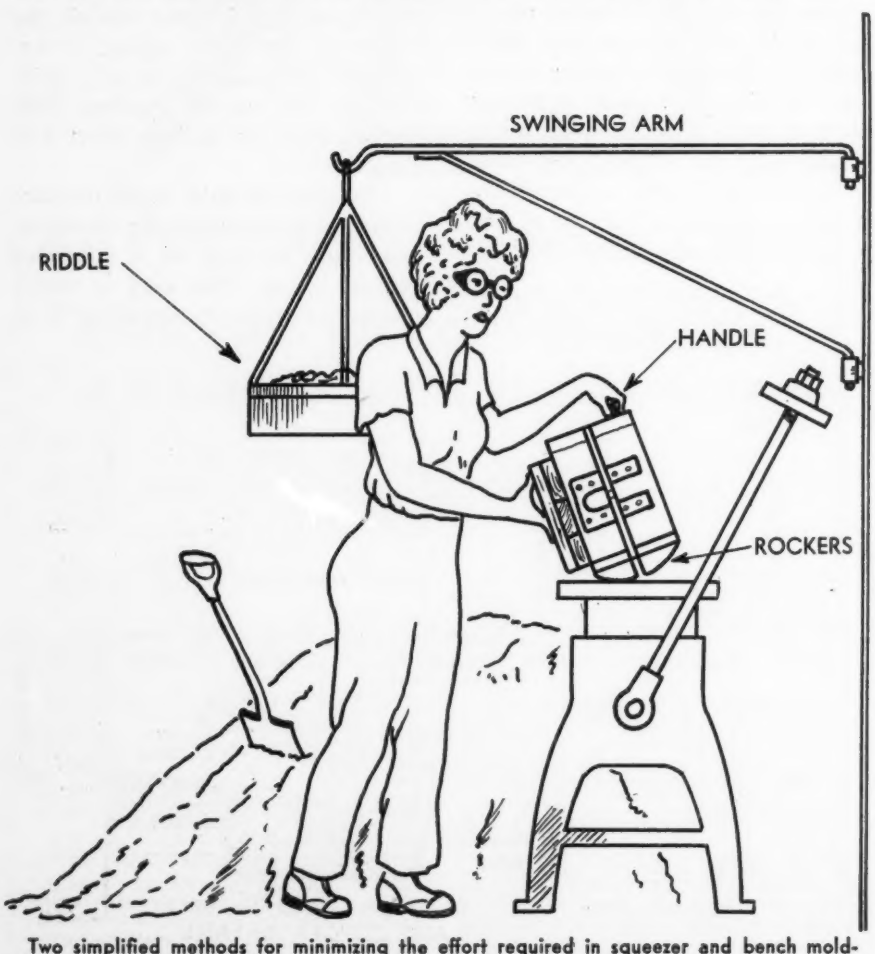
THE necessity for employment of women in many new occupations in foundries, particularly in squeezer and bench molding has brought about study for minimizing some of the effort required in these occupations. Two methods for simplified routine in this work have been adopted by the Richmond Works of International Harvester Co., Richmond, Ind.

In one of the operations the riddle is mounted on a swinging arm, moving across the sand heap and over the top of the flask. The woman molder shovels some sand into the riddle, swings the riddle on the arm over the flask, and riddles the sand onto the face of the mold. Thus, she does not have to handle the riddle, which might be too heavy for some women molders, and the sand riddling operation is performed with ease.

The other innovation that is applied to squeezer and bench molding at the Richmond plant is to fasten hardwood rockers that are firmly attached to the flasks by means of screws to the front side of the cope and the drag side of the flasks. An ordinary screen door type handle is placed on the back of the cope flask, to be used as a handle in rolling the mold into squeezing position.

In operation, the molder grasps the handle with one hand while the other hand holds the bottom board in place. The flask then can be easily rolled over to final position.

Other articles dealing with large-scale employment of women in foundry work include one by Dr. Paul A. Brehn, Wisconsin State Board of Health, in the June issue of *American Foundryman,* and articles by Sara Southall, International Harvester Co., Chicago, and T. M. Bost, Jr., Lynchburg Foundry Co., Lynchburg, Va., in the November issue of *American Foundryman.*



Two simplified methods for minimizing the effort required in squeezer and bench molding, adopted by the Richmond Works of International Harvester Co., Richmond, Ind.

Machining Data Wanted

PROF. O. W. BOSTON, Chairman, Department of Metal Processing, College of Engineering, University of Michigan, Ann Arbor, Mich., would like to secure information on tools used to machine brass and bronze alloys. Foundries with shops in which brass and bronze castings are machined are requested to get in touch with Prof. Boston and, if possible, send him information on types of machining tools used. Information submitted should include drawings of the type tools used, showing different cutting tool shapes, and giving as much information as possible on feeds and speeds. If information on tool life is available, this also would be of interest.

A STUDY entitled "An Introduction to Post-War Planning" has been issued by the Metropolitan Life Insurance Co. The report, based on material developed from more than 50 companies that have already inaugurated post-war planning programs, is designed to put before business executives information that will assist them in determining the need for post-war planning within their organizations and to help them define more accurately the scope of post-war planning activities that will best meet their own needs.

A copy of the survey is available to executives who write to the Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York City.

Since the proper selection and correct use of sand have a direct bearing on casting results, this article treats of the economy effected by changing the properties of sand in accordance with the work at hand. It compares the results of different bond clays and bond clay mixtures through comparative analyses and presents test information useful in the selection of proper clay for particular types of work. The first of this two-part article appears below.

How to Change the Properties of Sand

By N. J. Dunbeck
Eastern Clay Products Co., Eifort, Ohio

MANY casting defects are caused by good sand which is not properly selected for the particular job. Synthetic sand is flexible, and any particular sand can be expected to be satisfactory for a wide variety of work. It cannot be expected to do all jobs equally well, however, and it is good economy to change the properties of the sand in accordance with the work, particularly if defects are believed due to sand.

It is also reasonable to select the proper type clay for any particular class of work. In a following section facts are given on the proper selection of bond clays. In another section are given causes of defects and recommended changes in sand. In the present section, we discuss the actual mechanics of changing the properties of sand.

Green Strength

Many pretty word pictures are drawn of nature taking millions of years to thoroughly, uniformly and efficiently coat grains of silica with clay bond. In actual fact, neither natural nor synthetic sands carry a really uniform coating of clay, and in almost all sands there is clay between the grains as well as coating them.

In making synthetic sand, we strive for efficiency by having as much as possible of the clay actually on the grains, which means that mixing should be as thorough and intensive as possible.

Effect of Mixing

Clay can be mixed with sand with a hand shovel and a workable material produced. If the sand is mixed with a cutter, a blender or an aerating device, less clay will be required and a better sand produced. Still less clay will be required if a paddle type mixer is used, particularly if it is of the type which creates pressure on the sand between the blades and the side of mixer.

The least amount of clay is required and the best sand is produced when the mixture is intensively mulled. The increased efficiency fully justifies the cost of this type unit. Such thorough mixing also results in higher permeability, less tempering water required and higher flowability.

Fire clay binders require the longest mixing; Western bentonite mixes fast but has a tendency to form lumps if mulling is continued too long; Southern bentonite mixes fast and there is no formation of lumps on continued mulling.

It is important to aerate sand after mulling, to reduce the density and increase permeability and flowability.

In the 1941 American Foundrymen's Association *Transactions* appears an excellent article by Mooney,* describing the efficient and economical use of clay bond in slurry form by a General Motors Corporation foundry. This deserves study since this method of mixing will be more extensively used.

Effect of Water

There is a common belief that, as increasing amounts of tempering water are added to molding sands, green strength will increase to a peak, at what is called optimum water content, and then decline. This is true in the case of highly bonded natural sands where there is a considerable amount of clay to be made plastic and distributed. It is also true in the case of natural sands having a high silt content. Silt has great surface area and requires much water to become workable.

It is not true in the case of usual synthetic sands made from any type of clay bond, if we consider only the workable moisture range at ordinary strengths. In such usual sands, we obtain maximum strength at the point where the sand first becomes workable on the dry side and a definite reduction in green strength with each increase in water content. This is shown by the following tests on a sand mixture of the following composition: 90 per cent Michigan City sand and 10 per cent fire

Table 1
Relative Green Strengths of Several Types of Clay

	Green Comp. Strength, psi	*Tempering Water, per cent*
Non-Swelling bentonite—4 per cent Southern bentonite	9.19	2½
Swelling bentonite—5 per cent Western bentonite	9.10	2½
Kaolinite fire clay—10 per cent fire clay	9.02	3½
Kaolinite fire clay—14 per cent Illinois fire clay	9.20	3¾
Illite—8.9 per cent Illinois illite clay	9.08	3½
Illite—12 per cent Michigan illite clay	9.14	3½

*Mooney, R. H., *"Clay Slurry Additions for Molding Sand Rebonding,"* TRANSACTIONS, American Foundrymen's Association, vol. 49, pp. 940-952 (1941).

clay, mulled 1 min. dry and 4 min. wet.

Water, per cent	Green Compression Strength, psi
2	9.36
3	7.98
4	6.41
5	4.88
6	3.75

The fairly common idea that water added to a weak sand will make it stronger is incorrect; it may make it more workable, but it also makes it weaker.

Effect of Ramming

Our laboratory sand specimen is rammed to a certain hardness, while our mold may be harder or softer. If we ram a mold harder, we increase what might be called the effective strength. Work by Dietert gave these results:

No. of Rams	Hardness	Green Compression, Strength, psi
¼	0	1.2
½	41	1.9
1	65	3.3
2	78	5.3
3	82	6.8
9	92	14.1
18	95	26.0

Effect of Fines

Up to a minor percentage, fines mix with the bond increasing the green strength. In the quantity usually present, fines decrease green strength because they increase the amount of tempering water required, due to their large surface area.

Effect of Amount of Clay

Green strength is in general relation to the amount of clay used. As percentage of clay is increased, moisture must also be increased to keep the sand in workable condition. The proper balance between the two is not always maintained, causing unnecessarily high bond clay costs.

Table 2

Effect of Clay Combinations on Dry Strength

	Dry Compression Strength, psi
100 per cent Southern bentonite	40.0
75 per cent Southern bentonite, plus 25 per cent Western bentonite	42.0
50 per cent Southern bentonite, plus 50 per cent Western bentonite	59.0
25 per cent Southern bentonite, plus 75 per cent Western bentonite	69.0
100 per cent Western bentonite	83.0

All sand mixtures shown below would feel in workable condition to the average foundryman. It is seen that 10 per cent of clay at 3.3 per cent water had proper feel and as much strength as 12 per cent of clay at 4.0 per cent water. Many foundries could reduce their clay addition if they simultaneously reduced their moisture content.

Fire clay, per cent	12	12	10
Water, per cent	4.0	3.5	3.3
Permeability	85	87	103
Green Compression, strength, psi	8.5	10.5	8.7

Effect of Type of Clay

Some clays are stronger than others as described in other sections. The relative green strengths of several types of clay are shown in Table 1.

In these tests, enough of each clay was used to give approximately equal green strength and enough water to give proper feel.

It is immediately apparent that green strength can be very much increased by a change to a stronger clay or combination of clays, with no reduction in permeability or an actual increase. Therefore, green strength can be increased:

1. By more thorough mixing.
2. By adding the clay in form of a slurry.
3. By reduction in amount of tempering water.
4. By change to stronger type of clay.
5. By harder ramming.
6. By adding auxiliary binders such as corn flour, etc.
7. By adding more clay of the type in use.

Dry Strength

(Sample baked at 220° F.)

The hot strength (sample tested at 500-2500° F.) of sand probably has more effect upon castings than A.F.A. dry strength. Dry strength has some importance in the production of light castings where the surface casting skin is formed before the development of any appreciable hot strength. Dry strength also has importance in relation to cracked castings and lumpy sand at shake out, since much of the sand in most molds becomes hot enough for baking to take place.

Where, in the past, it has been customary to say that such defects as cuts and washes were due to low dry strength, it is probably more correct to say that they are due to low hot strength.

Effect of Mixing

Dry strength increases with more efficient mixing at an even more rapid rate than does green strength. It is also a little known fact that an increase in the dry mixing time causes a sharp increase in dry strength.

Effect of Water

Within the workable moisture range, an increase in tempering water causes a great increase in dry strength. For example, the following shows the results obtained by increasing the tempering water content in a sand mixture, containing 10 per cent fire clay:

Water, per cent	Dry Compression Strength, psi
2	23
3	35
4	43
5	67
6	74

Effect of Ramming

An increase in mold hardness sharply increases dry strength in the same manner that it increases green strength.

Effect of Fines

Fines usually increase dry strength because of a cementing action and because they increase the amount of tempering water required.

Effect of Type of Clay

With any one clay, the amount of tempering water is the most important factor in determining dry strength. The various types of clays differ greatly in dry strength. Southern bentonite has the lowest, kaolinite and illite are intermediate, and Western bentonite has the highest. Obviously, it is a simple matter to change and control dry strength by the selection of the type or combination of clays used, as indicated in Table 2.

Some types of clays deliver different dry strengths in use than would be indicated by laboratory tests, as will be discussed under collapsibility.

Effect of Amount of Clay

Dry strength increases as clay content is increased, provided more tempering water also is added.

Effect of Addition of Auxiliary Binders

Many auxiliary binders cause great increases in dry strength even when added in small quantities, as noted in Table 3.

Effect of Chemical Additions

Much research has been done by the writer's company on chemical additions and treatments. Most of this work is not yet ready for publication. Promising results have been obtained, but prolonged checking in service is needed to determine that an improvement in one property is not accompanied by a deterioration in another.

Effect of Sprays

Molasses water, a core oil mixture, or some similar binding element is sometimes sprayed on the mold face. This gives a harder surface and is sometimes desirable, since the remainder of the mold stays soft, with higher collapsibility. It has the further advantage that it may be used only on a few difficult molds, with no change necessary in the usual sand mixture.

Effect of Skin and Oven Drying

Such drying results in higher dry strength before pouring, instead of depending upon the somewhat uncertain development of dry strength during pouring. It is a worthwhile investment on valuable castings and is essential on very large castings. It is desirable insurance against defects caused by unskilled labor.

Use of Special Dry Strength Bond Clays

Only a few such special bonds are available. They differ so greatly in properties that general statements as to value are inadvisable. They usually contain from four to six ingredients, so proportioned as to deliver much higher strengths than the sum of the strengths of the individual components.

For best results it is essential that they be thermoplastic. In this application, the term is used to mean a softening under heat in the range between dry strength and hot strength. The dry strength delivered by such a special binder, special fire clay, is as follows, compared to the usual bond clays:

	Dry Compression Strength, psi
Southern bentonite	47.0
Fire clay	51.2
Western bentonite	83.0
Special fire clay	208.0

Therefore, dry strength may be increased as follows:

1. By more intensive mixing.
2. By increasing the moisture content.
3. By harder ramming.
4. By using a stronger clay or combination of clays.
5. By adding more clay.
6. By adding auxiliary binders.
7. By chemical additions.
8. By spraying molds with binders.
9. By skin or oven drying.
10. By using special dry strength binders.
11. By addition of fines. (Not usually desirable.)

Dry strength may be decreased as follows:

1. By decreasing moisture content.
2. By softer ramming.
3. By change in type of clay.
4. By using less clay.
5. By chemical additions.
6. By reduction in fines.

Hot Strength

Hot strength is any strength measured at a temperature above 220° F. We are interested in several types of hot strength.

1. We may wish to know the hardness or strength of an oven dried mold. In such case, we heat the test specimen to that temperature and cool before testing.

2. We may wish to know the strength of a skin dried mold. Since the temperature reached in such case is very indefinite, we must guess at it or simply observe the hardness of the dried surface.

3. We are most interested in the strength developed in the mold by the heat of the metal being poured. For this reason, we test the sand at various temperatures up to 2500° F. in the so-called shock test, which is made in the dilatometer type tester. In this test, the sample is broken while in the furnace at the selected temperature. The test gives very low strengths for most sands at 2500° F.

Since we usually pour iron and steel at higher temperatures, it is probable that this test is too severe, particularly as to length of exposure to heat before testing. In the average mold, we probably have a higher temperature, but are concerned with a shorter heating period since the sand must maintain strength only until the casting skin has been formed.

4. We are interested in the hot strength back from the mold face since this determines collapsibility and amount of lumps in shake out sand.

Effect of Mixing

The more intensive the mixing the higher the hot strength.

Effect of Water

Because of the temperature involved, the amount of tempering water would not ordinarily be considered as having much influence on hot strength. Nevertheless, it does have a very considerable influence, as shown by Dietert, as follows:

Water, per cent	4.5	5.4	5.9	6.0
Dry Strength, psi	39.5	65.0	85.3	87.0
Hot Strength, psi				
at 1000°F.	28.3	42.5	66.0	87.5
at 2000°F.	56.5	128.5	108.5	144.5

Effect of Ramming

At low and medium high temperatures, hot strength increases with mold hardness. The effect is less pronounced at 2500° F.

Effect of Amount of Clay

More clay plus more water means much higher hot strengths.

Effect of Type of Clay

The type of clay used has more effect on hot strength than any other factor. This is clearly indicated below:

Bond	*Water, per cent*	*Hot Strength at 2000°F.*
Fire clay, 10%	3.3	295
Fire clay, 12%	3.5	400
Fire clay, 12%	4.0	550
Southern bentonite, 4%	2.5	25
Western bentonite, 5%	2.5	490
Balanced fire clay, 8%	3.5	830

It is quickly seen that hot strength can be changed by changing the clay. Of even more importance is the flexibility in control afforded by the use of combinations of clay, as illustrated in Table 4.

We see in Table 4 how hot strength may be regulated by the use of combinations of clays and by changes in the amount used. In using the combination (a) there is no sacrifice in permeability as compared to the use of either clay separately.

Combination (b) in Table 4 also gives excellent flexibility in control of hot strength. The fire clay is lower in green strength and thus reduces permeability. It is, however, higher in refractory value and durability and its use results in lower costs, and possibly easier cleaning, than when Western bentonite is used.

When most clays are mixed, hot strength increases rather gradually from the weaker to the stronger. Combination (c) of Table 4, consisting of Southern and Western bentonite, gives an unusual peak strength, much higher than either constituent. We do not know the explanation. It is evident, however, that this provides an economical source of high hot strength, where it is required for the production of heavy iron or steel castings.

Effect of Fines

Fines increase hot strength in manner similar to addition of silica flour as later described.

The addition of most auxiliary binders increases the hot strength of most clays. If only a slight increase is necessary, this is a logical procedure. If a substantial increase is necessary, it is more economical to change the type of clay or use a combination of clays.

One unusual feature appears in Table 5, in that the addition of cereal binder gave a sharp decrease in the hot strength of Western bentonite. The principal effect of the cereal seems to be to increase collapsibility.

Use of Special Hot Strength Bond Clays

Comparative hot strength of such a bond is given in Table 5.

This particular bond, which is thermoplastic, has unusual value in preventing cuts and washes. It is our theory that upon first application of heat the bond is in a highly viscous condition which prevents the sand grains from washing prior to the establishment of final, high hot strength.

(Part 2 of this two-part article on "How to Change the Properties of Sand" will appear in the February issue of "American Foundryman.")

Table 3

Effect of Auxiliary Binders on Dry Strength

	Dry Compression Strength, psi
Southern bentonite	47.0
Southern bentonite, plus 1 per cent cereal binder	133.0
Southern bentonite, plus 3 per cent pitch	158.0
Southern bentonite, plus 1 per cent rosin binder	145.0
Fire clay	51.2
Fire clay, plus 2 per cent sulphite pitch	83.5
Fire clay, plus ½ per cent cereal binder	156.4

Table 4

Effect of Clays and Combinations of Clays on Hot Strength

	Bond, per cent	*Water, per cent*	*Hot Strength at 2000°F., psi*
(a)—SOUTHERN AND WESTERN BENTONITES:			
Southern bentonite	4	2.5	25
Southern bentonite, 75 per cent, plus Western bentonite, 25 per cent	4	2.5	65
Southern bentonite, 50 per cent, plus Western bentonite, 50 per cent	4.3	2.5	90
Southern bentonite, 25 per cent, plus Western bentonite, 75 per cent	4.8	2.5	95
Southern bentonite, 75 per cent, plus Western bentonite, 25 per cent	5	2.5	100
Southern bentonite, 50 per cent, plus Western bentonite, 50 per cent	5	2.5	190
Southern bentonite, 25 per cent, plus Western bentonite, 75 per cent	5	2.5	230
Western bentonite	5	2.5	490
(b)—FIRECLAY AND SOUTHERN BENTONITE:			
Fire clay	12	4.0	550
Fire clay, 75 per cent, plus Southern bentonite, 25 per cent	9¼	3.7	450
Fire clay, 50 per cent, plus Southern bentonite, 50 per cent	6½	3.2	238
Fire clay, 25 per cent, plus Southern bentonite, 75 per cent	5	2.6	85
Fire clay	4	2.5	25
(c)—FIRECLAY AND WESTERN BENTONITE:			
Western bentonite	5	2.5	490
Western bentonite, 75 per cent, plus fire clay, 25 per cent	5.2	2.3	560
Western bentonite, 50 per cent, plus fire clay, 50 per cent	6.8	2.8	830
Western bentonite, 25 per cent, plus fire clay, 75 per cent	8.5	3.5	1000 plus
Fire clay, 100 per cent	10	3.3	295
Fire clay	12	4.0	550

Table 5

Effect of Addition of Auxiliary Binders

Bond, per cent	*Water, per cent*	*Hot Strength at 2000°F., psi*
Southern bentonite, 4%	2.5	25
Southern bentonite, 4% plus 1% cereal	3.6	65
Southern bentonite, 4% plus 3% pitch	3.5	100
Southern bentonite, 4% plus 1% resin	3.5	96
Western bentonite, 5%	2.5	490
Western bentonite, 5% plus 1% cereal	3.5	280
Southern bentonite, 12%	4.0	550
Southern bentonite, 12% plus 4% sulphite pitch	4.0	680
Southern bentonite, 12% plus 1% cereal	4.2	630
Balanced Southern bentonite, 8%	3.5	830

Presentation of the Maritime "M" Award of the Maritime Commission was made to Foran Foundry & Mfg. Co., Flemington, N. J., at plant ceremonies November 27.

Great Congress and Show Already Certain

EVERY activity being planned for the 3d War Production Foundry Congress, to be held April 25-28 in the new Buffalo Auditorium, Buffalo, is being considered from the standpoint of aiding foundrymen in war production work. Sessions on inspection methods, centrifugal castings work, aluminum and magnesium advancements, heading and gating problems, training methods, and programs for each branch of the industry will make a well-balanced program, plus the attraction of streamlined exhibits of modern equipment and materials.

The 1944 Foundry Show is already an assured success!

Late in November the initial announcement of the Show was mailed previous A.F.A. exhibitors . . . and already the number of applications for space is as great as the total number of actual exhibitors in 1942. Never, with any previous Foundry Show, has the response of manufacturers and suppliers of foundry equipment and materials been so enthusiastic.

Wholehearted Acceptance

That response gives ample proof that the limitations placed on this Show by the A.F.A. Board of Directors last July have been accepted unanimously and whole-heartedly by firms desiring to exhibit and that all are now looking forward eagerly to the 3d War Production Foundry Congress, next April 25-28.

The new Memorial Auditorium in Buffalo is splendidly adapted for this "stripped for action" Show. However, although the Auditorium offers as much exhibit space as was actually used by the 1942 Show in Cleveland, the great demand for space in 1944 has made it necessary to limit the footage that can be assigned exhibitors.

In other words, it is now apparent that the 1944 Foundry Show will be edited as carefully in content as will the papers program for the Foundry Congress. Space limitations are expected to result in exhibitors concentrating on showing their latest machines and equipment, and in accepting additional space applications only from firms which are able to justify participation in the 1944 Foundry Show by having something to exhibit of lasting value to foundrymen visitors.

New Congress Sessions

Among the new subjects appearing on the program of the 1944 Foundry Congress will be sessions on Inspection of Castings, and Centrifugal Castings. M. D. Johnson, Caterpillar Tractor Co., Peoria, Ill., Chairman of the recently formed Committee on Inspection of Castings, reports that two sessions will be sponsored by his committee, one a panel discussion of certain outstanding problems, and one a session where informative papers will be read and discussed.

Developments in centrifugal casting methods will be covered by several papers coming from various branches of the industry, all of which have been devoting a great deal of attention lately to this method of producing cast products. Unusual interest is expected from these presentations.

The Aluminum and Magnesium Division program, being sponsored by a committee under the chairmanship of Wayne E. Martin, Sperry Gyroscope Co., Brooklyn, N. Y., will be even more extensive than in 1943.

Gating Lecture Course

A 4-session lecture course on Heading and Gating has been scheduled under chairmanship of W. G. Reichert, Reichert Engineering Co., Newark, N. J. This same subject will also be emphasized through a Symposium on Malleable Iron Gating and Heading, sponsored by the Malleable Division Committee under chairmanship of Carl F. Joseph, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich. Assisting Mr. Joseph as Secretary of the Committee is Herman Aufderhaar, who is associated with the Electro Metallurgical Co., Chicago.

Foundry training work will be covered in sessions sponsored by three committees — Apprentice Training, Foreman Training, and Co-operation with Engineering Schools.

One of the most extensive series of sessions will be that on steel foundry problems, now being developed by the Steel Division Program Committee under chairmanship of C. H. Lorig, Battelle Memorial Institute, Columbus, Ohio. As always, steel foundrymen undoubtedly will be well represented at the Congress.

War Problems Uppermost

The tentative schedule of meetings for the four days of the Congress calls for some 50 sessions, indicating that all branches of the industry will have papers dealing with the many current problems confronting foundry operators in these days of wartime production. In later issues of *American Foundryman*, as the committees complete their programs and check manuscripts, further and more complete information will be given to the industry as a whole.

As tentatively outlined, the Aluminum and Magnesium, Brass and Bronze, and Malleable Divisions will concentrate their sessions in the first three days of the Congress, with the Steel, Pattern and Gray Iron Divisions using the last three days. General Interest Committees—such as Cost, Inspection, Training, Sand Research, Plant and Plant Equipment, Safety and Hygiene, Refractories, and Job Evaluation —will be spread throughout the week.

Washburne J.F.A. Meets

THE first meeting of the newly formed Washburne Chapter of the Junior Foundrymen's Association, organized at Washburne Trade School, Chicago, was held November 15 at the school, with over 50 students attending. Roy W. Schroeder, foundry instructor at Washburne, presided and introduced

Martin Brauns Jr., director of the school, and several A.F.A. officials.

Guests from the national Association included B. L. Simpson, National Engineering Co., Chairman of the Chicago Chapter committee on apprentice training and junior foundrymen; C. V. Nass, Pettibone-Mulliken Co., member of the same committee; F. W. Gregg, Whiting Corp., Harvey, Ill., and N. F. Hindle, Asst. Secy. of A.F.A.

Official memberships in A.F.A. were presented by Mr. Simpson to the president and secretary of the Washburne Chapter of J.F.A., Joseph Armato and Donald Longanecker.

Hotel Reservations at 1944 Congress

HOTEL Reservation blanks are now being mailed all A.F.A. members for reserving rooms during the 3d War Production Foundry Congress and Foundry Show at Buffalo, April 25-28. Members are urged to make their plans for attending as soon as possible and to *make reservations early.*

All requests for hotel reservations should be sent *only* to Mr. A. J. Morgan, Manager, A.F.A. Buffalo Housing Committee, Genesee Bldg., Buffalo, N. Y. Reservations should not be made either with A.F.A. or with Buffalo hotels direct.

Special attention is called to the following procedure which will be followed in filling reservation requests. All requests will be acknowledged by Mr. Morgan promptly after receipt. However, no assignments of rooms will be made prior to March 1st. At that time, when most reservation requests will have been received, room assignments will be made and all parties notified of their assignments, with duplicate assignment notice to the hotel involved.

Every effort will be made for a fair allocation of available rooms throughout the Congress, to both members and guests.

A.F.A.-I.B.F. Again Exchange Papers

THE 1944 exchange paper of A.F.A. to be presented before the Institute of British Foundrymen is being prepared by A.F.A. Director M. J. Gregory, Factory Manager, Foundry Division, Caterpillar Tractor Co., Peoria, Ill. The subject of Mr. Gregory's paper will

M. J. Gregory

be *"Wartime Calls on Women to Make Air-Cooled Aluminum Cylinder Heads,"* and will describe the aluminum foundry recently completed by his company.

This new foundry is an outstanding example of a highly mechanized plant designed to utilize women workers almost exclusively. The air-cooled cylinder heads are made in molds produced by the core blowing method. Portions of the production technique were described in a paper before the 1943 Foundry Congress in St. Louis.

The I.B.F. paper to be presented before the 1944 A.F.A. War Production Foundry Congress at Buffalo next April is being prepared by J. Vickers, Foundry Superintendent, Rolls Royce Co., Ltd., England. Mr. Vickers' paper will deal with *"The Mechanized Production of Gravity Die Castings"* and will be presented before one of the A.F.A. Aluminum and Magnesium Division sessions at the Buffalo Congress.

This exchange of papers between the foundry associations of America and Great Britain was initiated in 1920, when the late George K. Elliott presented the first A.F.A. exchange paper before the I.B.F. Each succeeding year has been an unbroken series of exchange papers between these two Associations. Up to 1939 when the present world war began, other foundry associations such as those of France, Belgium, and Poland joined in this paper exchange adding many notable articles to foundry literature.

The author of the A.F.A. exchange paper, Mr. Gregory, is one of the outstanding foundrymen of the U. S. and is noted for

John Vickers

his willingness to show other foundrymen his methods and equipment. He has addressed many A.F.A. chapters and other foundry groups. He has a keen interest in apprentice training and the program at Caterpillar is widely recognized as a model.

Born in Rhode Island, Mr. Gregory was educated in the public schools there and later served as an apprentice at Brown & Sharpe Mfg. Co., Providence, R. I. He also studied at Brown University and Massachusetts Institute of Technology. At the latter institution, he had the privilege of being a student of metallography under the personal direction of the late Dr. Albert Saveur.

John Vickers, author of the I.B.F. exchange paper to A.F.A., is foundry manager, Rolls Royce, Ltd., England, which produces

air craft engine castings. Mr. Vickers is a native Englishman, having been born in Darlington, County Durham, England.

His early education was gained in Darlington Technical College and following graduation at the age of 16, he continued his technical studies at evening classes for another six years. He served a 5-year apprenticeship with Robert Stevenson & Co., Ltd., Locomotive Builders, Darlington, and upon completion of his apprenticeship, became associated with R. D. Crosthwaite and Co., Ltd., Ironfounders, of Thornaby on Tees, working as a journeyman patternmaker in the motor cylinder foundry of that organization.

In 1932, he became associated with the Rolls Royce, Ltd., as a patternmaker, being appointed superintendent in charge of the iron foundry in 1937, and in 1939 to foundry manager of another foundry of the Rolls Royce company, which produces air craft castings.

Mr. Vickers is a member of the Institute of British Foundrymen and of the American Foundrymen's Association. He is technical advisor on light alloy castings to the Ministry of Air Craft Production. In 1942, he was awarded a diploma of the Institute of British Foundrymen for a paper on aero engine castings, read before the Scottish Branch of the Institute.

3d Annual Chicago Lecture Course

WITH a record of two highly successful courses as a background, the Chicago Chapter of A.F.A. has announced that the 1944 Foundry Lecture Course will commence Wednesday, January 12. This year's course comprises the third year of a four-year educational program designed specifically for apprentices, foundrymen and salesmen, and all interested in the production of better cast metals.

As before, the course will be presented in a series of six lectures, held every other Wednesday from January 12 to March 22. The 1944 program will of course offer somewhat more advanced material, giving a more thorough presentation of subjects by foundrymen and experienced educators. Subjects this year include refractories, molding methods and materials, core making methods and materials, and the course will end with an inspection tour of foundry facilities at the Illinois Institute of Technology.

The lectures will be handled as panel discussions, chairmen acting as leaders for several authoritative speakers. Enrollments are accepted for the entire lecture series, or for individual lectures, in advance of each meeting date. Season tickets cost $1.00 per person, and all sessions are conducted in the Peoples Gas Building Auditorium, 122 S. Michigan Ave., Chicago, beginning at 7:15 p.m.

Outline of the 1944 Lecture Course, which is expected to attract a large enrollment because of widespread foundry personnel changes, is shown below. Reservations may be made through J. C. Thomas, Whiting Corp., Harvey, Ill., Secretary of the Lecture Course Committee, or through the Chairman, L. F. Lottier, Peoples Gas Light & Coke Co., 122 S. Michigan Ave., Chicago. Advance reservations are requested.

Heads New Committee

M. D. JOHNSON, Chief Inspector, Caterpillar Tractor Co., Peoria, Ill., has been appointed chairman of the new Castings Inspection Committee, whose organization was announced in the November issue of *American Foundryman*. Chairman Johnson also has announced the appointment of E. Platt, Castings Buyer, Purchasing Dept., Sperry Gyroscope Co., Inc., Manhattan Bridge Plaza, Brooklyn, N. Y., as secretary of the committee, and Robert J. Buqui, Industrial Engr., Aluminum Co. of America, 3311 Dunn Road, Detroit 11, Mich., as a new committee member. The membership of the Castings Inspection Committee, in addition to those mentioned, includes the following:

C. K. David, Continental Roll & Steel Fdry. Co., East Chicago, Ind.;
D. E. Harvey, Bay City Div., Dow Chemical Co., Bay City, Mich.;
E. G. Leverenz, American Steel Foundries, Cast Armor Plant, East Chicago, Ind.;
F. Poettgen, American Steel dries, Cast Armor Plant, East Chicago, Ind.;
H. C. Stone, Belle City Malleable Iron Co., Racine, Wis.;
Harold Warner, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Chicago Chapter Foundry Lecture Course

SCHEDULE OF LECTURES

Lecture No. 1—January 12
Subject: "Refractories."
Chairman, R. A. Witchey, A. P. Green Fire Brick Company.

Lecture No. 2—January 26
Subject: "Molding Methods."
Chairman, A. W. Gregg, Whiting Corp., Harvey, Ill.

Lecture No. 3—February 9
Subject: "Molding Materials."
Chairman, L. A. Hahn, Sivyer Steel Castings Co., Chicago.

Lecture No. 4—February 23
Subject: "Core Making Methods."
Chairman, H. K. Briggs, Miller & Co., Chicago.

Lecture No. 5—March 8
Subject: "Core Making Materials."
Chairman, R. W. Schroeder, Washburne Trade School, Chicago.

Lecture No. 6—March 22
Subject: Inspection Tour of Foundry Divisions, Illinois Institute of Technology.
Chairman, Dr. Harold Vagtborg, Illinois Tech.

Recommendations to Buyers of Castings

(Data Required for Intelligent Estimation of Casting Costs)

(First issued 1931, Revised Oct. 25, 1943)

The Recommendations to Buyers of Castings reproduced here include data required for intelligent estimation of casting costs and are revised from the original material first published in 1931 by the A.F.A. Cost Committee. Present revisions have been approved by the Cost Committee on recommendation of its Subcommittee on Revisions, personnel of which includes:

Chairman C. A. Davis, Caterpillar Tractor Co., Peoria, Illinois.

John L. Carter, Newark, N. J. (Representing Gray Iron Founders' Society).

E. W. Horlebein, Gibson & Kirk Co., Baltimore, Md., (Representing Non-Ferrous Founders' Society).

John A. Wagner, Wagner Malleable Iron Co., Decatur, Ill. (Representing Malleable Founders' Society).

C. S. Roberts, Dodge Steel Co., Philadelphia. (Representing Steel Founders' Society of America).

Introduction

THE requirements of increasing production, with its larger organizations and more highly developed degrees of specialization within both the using and producing organizations, have tended to emphasize the need for the highly beneficial mutual consultation of buyer and seller of castings. It is a tribute to industry in general that it has successfully been able to meet this need through the development of adequately trained personnel. Much of this progress can be attributed to the interchange of information made possible through our technical societies.

It has been aptly stated that production of a casting is a joint undertaking of the buyer and seller. This is true because the buying organization controls the design of the part to be produced and not infrequently supplies the patterns, flasks, inspection tools, or other important parts of the total production equipment.

Design Influences Quality

It is evident that much of a foundry's ability to produce castings of high quality depends upon the design of the casting. Appropriately, there is an increasing trend toward mutual consultation of user and producer of castings in matters pertaining to design. Examples of the benefits of this practice accruing to buyer and seller alike—and to the ultimate consumer as well—abound in the minds of interested persons and in the pages of an expanding literature of industry.

Improved understanding of the producers' problems, on the part of designers, and greater skill in meeting design requirements by the foundry are the inevitable results of such collaboration. The buyer, by soliciting the foundry's cooperation in this respect, takes an important step in improving the quality of the castings he receives, in improving the price he has to pay, and in increasing the ultimate economy of his product to its user.

While design considerations bear an important relation to quality and price, it is equally true that the foundry organization needs complete descriptions of the equipment with which it is to work, and accurate information pertaining to delivery requirements in order effectively to plan balanced production schedules, and intelligently to compute a reasonable price for doing the work involved. Experience has proven the advantage to user and producer of firmly indicated schedules, calling for delivery not in advance of actual requirements, and of adequate descriptions of the existing equipment intended to be furnished by the buyer.

The type of cooperation implied by all of the foregoing can only result in higher quality castings for the using organization, produced and delivered at a lower cost and in less time than would otherwise be possible. In order to summarize and make reference easier, a check list of information to be supplied with an inquiry for casting prices, together with a suggested form (Fig. 1) of inquiry, follow.

Inquiries from buyers of castings should give the following essential information in order to facilitate receiving an accurate estimate based on the conditions involved in performing the work to be quoted upon.

I. Description of Casting Wanted.

(A) *Detailed Drawing* showing actual or estimated weight of casting; dimensions; tolerances on important casting dimensions; machined surfaces and amount of finish to be allowed; any required finish other than commercial cleaning; locations for part number, trade marks, or other symbols; whether raised or sunken symbols are preferred; heat treatment required, if any; description of service or use if this be in any way likely to require unusual foundry practices; first operation locating points and kind of metal as outlined in Paragraph C, below.

(B) *Sample Casting:* If at all possible, a sample casting should be supplied for estimating purposes. The sample can be a scrap casting, and in any event it should not necessarily be intended as an example of the quality of casting expected.

(C) *Kind of Metal* including chemical composition, physical properties with permissible variations in these, or reference to a specification, preferably ASTM*, to be met. For gray iron castings it is undesirable to specify both chemical composition and definite physical properties unless these be made to conform with the practice of a particular foundry, and are not intended to be reproduced in another.

It is recommended, therefore, that a relatively liberal range of chemistry be specified when definite physical properties are wanted in gray iron. If non-ferrous, state whether virgin, remelt or secondary metal is to be used. If tests, such as

*American Society for Testing Materials.

pressure tests, be required they should be described and the method of testing given.

State where and by whom tests are to be made. Should test bars be required by the customer, or for certification of properties by the foundry, the inquiry should give all details relating to such bars, or certification.

(D) *Additional operations,* not described in material specifications or on blueprint: Any unusual operations required, such as painting, japanning, galvanizing, enameling, polishing, Sherardizing, Parkerizing, or pickling or special cleaning as a preparation for these or other surface treatments; or any machining operations should be specified. Location of possible interference with tooling or in assembling at user's plant should be indicated. If inspection of castings at foundry regularly by representatives of buyer or of other interested organizations be required, this fact should be stated. If radiograph or magnaflux inspection be required the areas to be so inspected should be defined preferably in the blueprint. State also if such inspection be required on sample, random castings, or all castings.

REQUEST FOR CASTING QUOTATION

Material Specification: .....Per Blue Print.....attached (Part No.)

Wt. ea. Estimated .....lb. Actual Please quote price per each in quantities of....., ..., ...,

F.O.B.....for Delivery by.....

Pattern, Type:

Pattern is designed for castings to be made of.....and patternmaker's shrink of.....inch per foot was used in its construction. (Material)

not suitable
.....Loose, not gated, suitable for mounting on plate.

.....Loose, gated, with.....units per gate; approximate overall size.....

.....Wood, on board, with.....units per board, for flask size.....

.....Match Plate, with.....units per plate, for flask size.....

.....Cope & Drag, with.....units on board, for flask size.....

The patterns mounted on plates or boards cannot / can be readily removed or remounted.

Pattern, Material: Pine, Mahogany, Aluminum.....Old / New has run approx.....molds (Other)

Core	Cores Per Castg.	Material of Boxes	Number of Boxes	Cores Per Box	Designed for Blower	Material of Dryers	Number of Dryers
A	.....	.....	.....	.....	.....	.....	.....
B	.....	.....	.....	.....	.....	.....	.....
C	.....	.....	.....	.....	.....	.....	.....
D	.....	.....	.....	.....	.....	.....	.....
E	.....	.....	.....	.....	.....	.....	.....

.....Total Cores per Casting

No pattern is available.

Please quote on supplying temporary production equipment for approximately.....pieces.

Flasks: Quantity available..... Type..... Make.....

Size..... Construction.....

Approximate annual requirement.....pieces. Approximate quantity per order.....pieces

These quantities are estimates for general guidance only. They may be changed without notice.

Radiographic / Magnaflux inspection by foundry is / is not required for sample only / random castings / all castings

Previous Difficulties: *Nature* *Location*

.....

.....

.....

.....

Remarks.....

(E) *Previous Experience:* If any difficulties have been encountered with the casting, their type, location, and frequency should be given.

II. Equipment.

(A) An adequate description of available pattern equipment should be given including:

1. Type of pattern—

Loose (number of patterns, and if suitable for mounting on plate).

Gated (number on gate and overall dimensions).

Mounted on plate (number of plate, size of plate, and whether or not patterns and gates are removable).

Machine, cope and drag (number on equipment, size of board, and whether or not patterns and gating are removable).

2. Material of pattern—

Wood (hard or soft, metal reinforced).

Metal (state kind).

Other materials.

3. Number of cores per casting, with description of core boxes.

Number of cores per core box.

Material from which core box is made.

Whether or not designed for core blower.

Number, kind, and material of dryers.

4. Metal for which pattern was originally made, and pattern makers' shrink used in its construction.

5. Approximate age, in molds made, and condition of existing pattern.

6. If no pattern be available, state—

Whether or not foundry is to make pattern.

If a separate shop is to make the pattern, the producing foundry should be given an opportunity to suggest how pattern should be made.

7. If buyer is to furnish flasks, the quantity available, along with size, type, make, and construction should be given.

III. Quantity Required.

Give quantity to be quoted upon, and delivery schedule not in advance of actual requirements. State approximate quantity which will be accepted over or under ordered quantity. State if shipments will be accepted in advance of schedule. Knowledge of the approximate yearly requirement is helpful but not necessary.

IV. Packing, Marking.

If inquiry be directed to a foundry not familiar with buyer's requirements affecting packing and marking of castings, then the details of these requirements should be described.

V. Price.

State whether price is wanted per piece, per pound, or by the lot; and the f.o.b. point to be used in quoting.

Help the War Effort

THE Associated Defense Committees of Chicago Technical Societies have issued an urgent request for names and addresses of all engineers or scientists who have technical information concerning industries, communications, transportation, raw materials, etc., of any areas in Europe or in the Pacific, which are now held by the enemy or might conceivably become theaters of war operations. The committee is also looking for still pictures or moving pictures of coastlines, harbors, industrial centers, etc.

Similar requests have been issued in the past and response has been satisfactory, but more data are needed. The present request is being issued at the request of certain government agencies, and is of great importance.

Any person having the information of the type indicated above, or who knows someone having such information, please communicate with Robert C. Brown, Jr., Chairman, Associated Defense Committees, 226 W. Jackson Blvd., Chicago. Please give all possible details.

McElwee Speaks to A.S.M.E.

A MEETING of great significance to foundrymen was held on November 23 in New York when R. G. McElwee, Vanadium Corp. of America, Detroit, and a member of several A.F.A. committees, addressed the Metropolitan Junior Section, American Society of Mechanical Engineers. F. J. Sefing, International Nickel Co., Inc., New York, and Past Chairman, A.F.A. Metropolitan Chapter, served as Chairman of the meeting. The meeting was extremely successful and afforded an opportunity to discuss the application of gray iron castings to engineering design.

Mr. McElwee discussed "Gray Iron as an Engineering Material." His talk emphasized properties peculiar to gray iron, such as vibration damping capacity, high ratio of compression to tensile strength, wear resistance, good machinability, with a wide range of mechanical properties. He also brought out the importance of proper application of gray iron in engineering structures by taking advantage of those properties. Because gray iron can be bought at reasonable prices, it is attractive to the design engineer. Mechanical engineers have great difficulty in understanding the parlance of metallurgists. Such meetings tend to clear up misunderstandings between foundrymen and metallurgists on the one hand and mechanical engineers and designers on the other. They also bring out the advantageous properties of cast materials. Foundry metallurgists and foundry engineers will do well to present their information to mechanical engineers from the engineering and not from the metallurgical viewpoint.

The comments of the mechanical engineers at this meeting emphasized the great need for presenting to engineers at frequent intervals data on engineering properties and applications of cast metals.

Part 2 of this 7th code of recommended practices for foundry safety and hygiene, presented herewith, completes the latest code prepared by the A.F.A. Industrial Hygiene Codes Committee, under the chairmanship of Jas. R. Allan. Complete copies of the code are available in pamphlet form.

A.F.A. Code of Recommended Practices for Industrial Housekeeping and Sanitation

Section VIII—Toilet Rooms

(A) Toilet Rooms

Every plant shall be provided with toilet room facilities for employees except that privies may be used under certain conditions as specified hereafter.

(B) Toilet Rooms for Each Sex

Where there are more than a total of five (5) employees of both sexes per working shift, separate toilet rooms shall be provided for each sex. There shall be no doors or openings of any kind connecting toilet rooms used by males and females. Toilet rooms shall be plainly marked "MEN" or "WOMEN." In toilet rooms used exclusively for females, covered receptacles shall be provided for the discarded personal hygiene requirements of the females, and the contents of such receptacles shall be disposed of daily.

(C) Toilet Room Construction

Toilet rooms shall be constructed and plumbing fixtures provided as per the following:

(1) Walls:

The walls of toilet rooms shall extend to the ceiling of the building in which they are located, except that toilet rooms located in high vaulted areas shall have walls not less than eight (8) feet high and a complete ceiling built over the entire area of the toilet room and with the further exception that toilet rooms located on mezzanine floors or built in the roof trusses of buildings where there is no view from above into the toilet room from another elevation or crane and the like, shall have walls not less than eight (8) feet high, and no ceiling will be required.

(2) Wall Materials:

The interior walls shall be built of solid construction to at least eight (8) feet above the floor line. Above the eight (8) foot line, materials may be used that are not transparent. Windows glazed with non-transparent glass shall be used in all exterior walls.

(3) Floors:

Toilet rooms containing more than a total of two water closets or urinals shall have the floors and cove base constructed of materials which are water-tight and impervious to moisture. The cove base shall be integral with the floor and not less than six (6) inches high.

(4) Location of Doors:

All doors for means of ingress and egress shall be provided with an automatic closing device. The doors of toilet rooms for males and females shall not be located closer than six (6) feet. The doors shall be so located that the toilet fixtures are not visible from the outside through the doors except that partitions may be located and built within at least one (1) foot of the floor and not less than six (6) feet high to screen the interior of the toilet room from beyond the door view. Doors may be provided with glass that is not transparent.

(5) Lavatories:

Every toilet room shall be provided with at least one (1) lavatory.

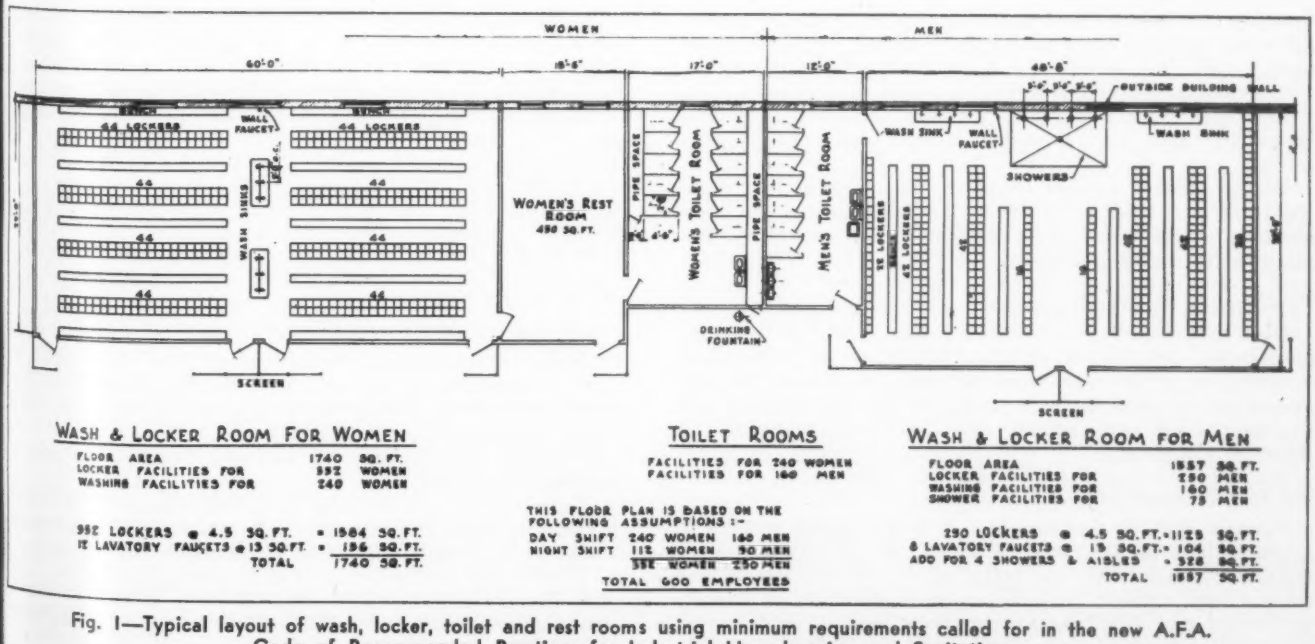

WOMEN
MEN
44 LOCKERS
WALL FAUCET
WASH SINKS
WOMEN'S REST ROOM 490 SQ. FT.
PIPE SPACE
WOMEN'S TOILET ROOM
MEN'S TOILET ROOM
DRINKING FOUNTAIN
SCREEN
WASH SINK
SHOWERS
OUTSIDE BUILDING WALL
WASH & LOCKER ROOM FOR WOMEN
FLOOR AREA 1740 SQ. FT.
LOCKER FACILITIES FOR 352 WOMEN
WASHING FACILITIES FOR 240 WOMEN
352 LOCKERS @ 4.5 SQ. FT. = 1584 SQ. FT.
12 LAVATORY FAUCETS @ 13 SQ. FT. = 156 SQ. FT.
TOTAL 1740 SQ. FT.
TOILET ROOMS
FACILITIES FOR 240 WOMEN
FACILITIES FOR 160 MEN
THIS FLOOR PLAN IS BASED ON THE FOLLOWING ASSUMPTIONS :-
DAY SHIFT 240 WOMEN 160 MEN
NIGHT SHIFT 112 WOMEN 90 MEN
352 WOMEN 250 MEN
TOTAL 600 EMPLOYEES
WASH & LOCKER ROOM FOR MEN
FLOOR AREA 1857 SQ. FT.
LOCKER FACILITIES FOR 250 MEN
WASHING FACILITIES FOR 160 MEN
SHOWER FACILITIES FOR 75 MEN
250 LOCKERS @ 4.5 SQ. FT. = 1125 SQ. FT.
8 LAVATORY FAUCETS @ 13 SQ. FT. = 104 SQ. FT.
ADD FOR 4 SHOWERS & AISLES = 328 SQ. FT.
TOTAL 1857 SQ. FT.

Fig. 1—Typical layout of wash, locker, toilet and rest rooms using minimum requirements called for in the new A.F.A. Code of Recommended Practices for Industrial Housekeeping and Sanitation.

(6) Facilities not Permitted:

No toilet room shall be used for locker space or for lunching. No drinking or bathing facilities shall be provided in toilet rooms.

(D) Number of Water Closets

The number of water closets for each sex provided in toilet rooms shall not be less than indicated in the following table:

No. of Persons Working in Any Single Shift		*No. of Water Closets*
Male	*Female*	
1 to 9 inclusive	1 to 8 inclusive	1
9 to 24 inclusive	9 to 20 inclusive	2
25 to 49 inclusive	21 to 40 inclusive	3
50 to 74 inclusive	41 to 60 inclusive	4
75 to 99 inclusive	61 to 80 inclusive	5
Over 99	1 for each additional 30 persons.	
Over 80	1 for each additional 26 persons.	

(E) Installation of Water Closets

Water closets shall be installed according to the following requirements:

(1) Spacing of Water Closets:

Every water closet shall be within a compartment separated from the toilet room proper by means of partitions. The partitions shall be spaced not less than two feet eight inches (2-ft. 8-in.) wide and not less than four feet six inches (4-ft. 6-in.) front to back.

(2) Construction of Water Closet Partitions:

Partitions shall be made of solid construction which can be readily cleaned and kept in a sanitary condition and shall be within twelve (12) inches of the floor and not less than six (6) feet high. A door shall be located at the entrance of the water closet compartment and such door shall be provided with a lock or fastener on the inside.

(3) Construction of Water Closets:

Water closets shall be constructed of vitreous china or other impervious material. The surfaces left exposed after installation shall have a glazed, smooth finish. The trap shall be made an integral part of the bowl and shall be so formed as to maintain a water seal two-and-a-half (2½) inches when filled to the overflow. Bowls shall embody an integral flushing rim constructed so as to wash the interior of the bowl at each flushing. The outlet of the bowl shall be constructed to afford a gas-tight connection between the bowl and waste pipe. The water supply shall enter the bowl through the flushing rim in sufficient quantities to thoroughly remove all waste material at each single flushing, with sufficient clear water left within the bowl to form the necessary trap seal and water surface.

The installation of pan, plumber, washout, trough, range and long hopper water closets shall not be permitted.

Water closets, except those of the integral seat type shall be provided with an open front seat. The seat shall be constructed of or surfaced with non-absorbent material or finish.

(F) Number of Urinals

Urinals shall be installed on the basis of one (1) urinal for not less than ten (10) men or more than seventy-five (75) men working on any one shift; and additional urinals shall be installed on the basis of one (1) urinal for each seventy-five (75) men per shift or fraction thereof.

(G) Installation of Urinals

Urinals shall be located in the toilet rooms, except if accessibility to the men working in certain areas is necessary they may be installed in an area not frequented by women. In such cases a partition extending to within one (1) foot of the floor and at least seven (7) feet high shall be built around the urinal. A self-closing entrance door shall be provided if the urinal is visible from the outside entrance to the compartment. No ceiling is required on such urinal compartment installations, and lavatories need not be installed.

(H) Construction of Urinals

Urinals may be of the single-fixture type or trough type. Where the trough type is used, twenty-four (24) inches of trough shall be considered equivalent to one (1) urinal. Urinals shall be constructed of vitreous china or other impervious material. The surfaces left exposed after installation shall have a glazed, smooth finish. The water supply for flushing purposes shall be of sufficient quantity to remove all waste material at each single flushing. Every urinal shall be provided with the necessary trap seal.

(I) Toilet Facilities Where There Are No Sewer Connections

Toilet facilities may be installed where there are no sewer connections or septic tank facilities and it is impractical to install any sewer system, under the following conditions:

(1) Privies for Each Sex:

Privies shall be provided for each sex on the basis of the requirements under Section VIII (D). Privies for each sex shall be plainly indicated.

(2) Suitable Ground Conditions:

Privies may be installed where the character of the ground and seepage conditions will not contaminate water supply for human consumption. The pit for such privies shall be sheathed to prevent the sides of the earth from caving in.

(3) Construction of Privy Vaults:

Where there is danger of contaminating underground water supplies, such privies shall be provided with a tight concrete or metal vault to receive the excreta, or removable tight cans shall be used.

(4) Construction of Privy Superstructure:

All privies shall be constructed and maintained so that there will be no cracks or open spaces in that portion of the superstructure between the seat and the floor or between the floor, pit, vault, or space where the cans are kept.

Every privy shall be provided with a door, and such door shall be provided with a self-closing device.

Lids over the seats shall be provided and so constructed as to fall in a closed position when the seat is not occupied. The pit, vault or space under the superstructure shall be ventilated to the outside air by means of a stack protected at its outlet by fly screen. Every privy shall be ventilated by an opening to the outside, the lower portion of which is located at least six (6) feet above the floor line and containing not less than one (1) square foot of open area. Such ventilating openings shall be protected with fly screens.

(5) Maintenance of Privies:

Privies shall be maintained in a sanitary condition. A tight receptacle shall be provided for lime or other deodorants and a scoop provided so that lime or other material may be sprinkled upon the excreta in the can, vault or pit below.

(6) Chemical Closets:

Where chemical closets are installed they shall be constructed and maintained in a sanitary condition. The containers used under the seats shall be made of materials suitable for such use and the construction of such containers shall permit maintaining the containers in a sanitary condition.

Containers shall be charged with chemical solutions of proper strength, and the contents of such containers shall be thoroughly agitated each day when in use.

When the container is more than two-thirds (2/3) full the contents shall be removed and disposed of in a manner that will not produce any unsanitary or dangerous conditions.

Vent stacks shall connect with the vault below the seat leading to the out-of-doors. The outlet of such vent stacks shall be covered with fly screen. Stacks shall be maintained in a clean and sanitary condition.

(J) Toilet Paper

Toilet paper shall be provided for each water closet, privy and chemical closet. A holder or retainer shall be provided for toilet paper at each facility.

(K) Toilet Room Temperatures

The temperature of toilet rooms other than privies during periods of occupancy shall not be less than 65° F.

Section IX—Wash and Locker Rooms

(A) Wash and Locker Room Requirement

Wash and locker room facilities shall be provided for each sex when the number of either sex exceeds ten (10) regularly employed on any single work shift.

(B) Place to Be Provided for Employees' Belongings

Clothes racks, lockers, locker baskets or suspended devices shall be provided for every employee regardless of whether a wash and locker room is required.

If lockers, locker baskets or other suspended devices are provided they shall be of a type that can be locked.

(C) Construction of Wash and Locker Rooms

Wash and locker rooms shall be constructed and equipped as per the following:

(1) Construction of Wash Rooms:

If wash rooms are constructed as separate units they shall be constructed in accordance with Section VIII (C).

(2) Construction of Combined Wash and Locker Rooms and Separate Locker Rooms:

When wash and locker rooms are combined in a single unit or locker rooms are built as separate units, they shall be so constructed that the walls shall extend to the ceiling of the building in which they are located except that when located in high vaulted areas the walls may not be less than eight (8) feet high, and the wash and locker room combination, or the locker room, completely sealed over to keep dust and dirt off the employees' belongings.

(3) Floors:

The floors of combined wash and locker rooms and separate locker rooms shall be constructed of or covered with materials impervious to moisture so that they may be kept in a clean and sanitary condition.

(4) Location of Doors:

All doors of combined wash and locker rooms and separate wash and locker rooms for means of ingress and egress shall be provided with automatic closing devices. The doors of wash and locker rooms for males and females shall not be located closer than six (6) feet apart. The doors should be so located that the interior of the rooms is not visible from the outside through the doors except that partitions may be located and built within at least one (1) foot of the floor and not less than six (6) feet high to screen the interior of the room from beyond the door view.

Doors may be provided with glass that is not transparent. Wash and locker rooms shall be plainly marked "MEN" or "WOMEN."

If wash and locker rooms are built as separate units or in combination, and adjoin toilet rooms, there shall be a connecting door between the facilities.

(D) Washroom Facilities

Every washroom shall be provided with lavatories and/or shower baths as per the following:

(1) Lavatories:

Lavatories shall be provided for employees per shift on the following basis:

No. of Employees	*Lavatories*
1 to 15 inclusive	1
16 to 30 inclusive	2
31 to 50 inclusive	3
For each additional 25 employees or fractional part thereof, there shall be provided	1 additional lavatory

The lavatories may consist of individual units or wash sinks or circular fountains. Where wash sinks or circular fountains are used, twenty-four (24) inches of outside rim of a wash sink and seventeen (17) inches of outside rim of a circular fountain shall be the equivalent of one (1) lavatory.

(2) Construction of Lavatories:

Lavatories, wash sinks or circular fountains shall be constructed of vitreous china or other impervious material. The surfaces left exposed after installation shall have a glazed, smooth finish.

Individual lavatories may be equipped with a drain plug or stopper. Wash sinks and circular fountains shall not be equipped with a drain plug or other stopper.

All lavatory facilities shall be equipped with hot and cold water faucets and wash sinks and circular fountains may be equipped with spray pipes provided with valves for controlling the hot and cold water supply. Spring-closing hand-operated faucets shall only be permitted in single lavatories provided with stoppers.

(E) Floor Space Required for Washroom Facilities

There shall not be less than thirteen (13) square feet of floor space provided for lavatory or its equivalent, including aisle space where only used for washing purposes exclusive of shower baths. If the washroom is consolidated with the locker room the figure of thirteen (13) square feet may be reduced, depending on the amount of adjacent aisle space common to both the locker room and the washroom.

(F) Shower Baths

Shower baths shall be provided for employees regularly engaged in operations where injurious and toxic liquids, chemicals and dusts are produced and come in contact with the bodies of the employees, or where the operations cause the bodies, except faces, hands and arms of the employees to become so covered with grime, dirt and grease that the street clothes of the employees become soiled when they change into them after the working shift. In such cases, shower baths shall be provided on the basis of one shower to each twenty (20) employees or fractional part thereof, and such showers shall be installed in accordance with the following:

(1) Shower Bath Stalls:

Individual shower bath stalls shall not be less than thirty-two (32) inches wide and thirty-two (32) inches deep. Where batteries of showers are installed in a line, the shower heads shall be located on three-foot (3-ft.) centers and no partitions need be provided separating the shower spaces.

(2) Shower Bath Floor Construction:

The floors of all shower bath installations shall be constructed of materials impervious to water, and the floors shall be pitched to readily drain off into a floor drain. Where the floor connects with a wall, forming a part of the shower installation, a cove shall be made integral with the floor not less than six (6) inches high.

Means shall be provided for covering the soapy floors in and around shower bath installations with shower mats, sheets of roofing paper and the like, to prevent employees from slipping and falling. Such anti-slip coverings shall be removed and cleaned at frequent intervals or new material laid on the floors.

(3) Soap:

Every lavatory or shower bath shall be provided with soap. Where powdered or liquid soaps are used, suitable dispensers shall be provided for the kind of soap used. The soap shall be of such composition and free from

A Government emblem for companies which have established plant protection organizations.

excessive amounts of abrasives that it shall not harm the skin of employees.

(G) Locker Room Equipment

The equipment provided in locker rooms for employees' belongings shall be of a type that will permit good housekeeping and maintaining in a sanitary condition. The general types of equipment shall conform to the following rules:

(1) Clothes Racks:

If clothes racks are provided there shall be a shelf at least twelve (12) inches x twelve (12) inches above the racks for lunches, hats, and the like. Clothes shall not be spaced so close that there is no chance for circulation of air and clothes hangers shall not be spaced closer than six (6) inches apart.

(2) Lockers:

Where lockers are provided, the lockers shall not be less than one hundred and forty-four (144) square inches cross-sectional area, and shall be of the single height type. Double height lockers shall not be used. The top of the lockers shall be sloped so that articles cannot be stored there or used for shelf purposes.

Louvers shall be provided in the top and bottom of the locker door to permit circulation of air through the interior of the locker.

The management shall make periodic inspection of all lockers to maintain them in a sanitary condition.

(3) Locker Baskets and Other Suspended Devices:

Where locker baskets or other suspended devices are provided for the employees' belongings, they shall be installed at sufficient ceiling height so that the clothes hanging in a suspended manner shall not be less than seven (7) feet above the floor.

Such locker baskets and other suspended devices shall be installed in staggered arrangement with spacing of not less than fifteen (15) inches apart on line and eleven (11) inches apart in parallel lines.

(H) Locker Room Benches

Benches or stools shall be provided for not less than fifty (50) per cent of the number of employees using the locker room per shift.

(I) Floor Space Required for Employees' Belongings

The floor space required for clothes racks, lockers or locker baskets and other suspended devices, plus the stools or benches provided, plus whatever aisle space is necessary for employees to reach the facilities, shall not be less than four and five-tenths (4.5) square feet per facility.

(J) Wash and Locker Room Temperatures

The temperature of wash and locker rooms during periods of occupancy shall not be less than 72° F.

Section X—Rest Rooms for Women

(A) Rest Room Requirements

Every plant employing more than five (5) women shall provide a rest room for women located adjacent to and connecting by means of a door, with the women's toilet room, except that establishments that have a plant or factory hospital or medical dispensary on the premises equipped with cots or beds, and where the total number of women regularly employed per working shift does not exceed one hundred (100), shall not be required to provide such rest rooms.

(B) Floor Space Required

No rest room shall contain less than sixty (60) square feet gross floor area and an additional two (2) square feet of floor area shall be added for each female over ten (10) in number up to and including one hundred (100). When over one hundred (100) females are regularly employed on any one shift, the area of such rest room shall be increased one-and-a-half (1½) square feet for each additional female.

(C) Furniture Required

One cot, couch or bed shall be provided when one hundred (100) females or less are regularly employed per shift. When over one hundred (100) females are regularly employed per shift, cots, couches, or beds shall be provided on the basis of one for each additional two hundred fifty (250) females or fraction thereof. Chairs or benches shall also be provided.

(D) Construction of Rest Rooms

Rest rooms shall be separate from all other rooms but shall be connected with the women's toilet room by a door. They shall be constructed in the same manner as provided for in Section VIII—(C)—1 and 2.

The floors shall be constructed of or covered with materials impervious to moisture so that they may be kept in a clean and sanitary condition.

(E) Doors

All doors for means of ingress and egress shall be provided with an automatic closing device. The doors shall be plainly marked "WOMEN" and such doors shall not be located closer than six (6) feet to wash, locker and toilet rooms used by males.

(F) Rest Room Temperature

The temperature of rest room during periods of occupancy shall not be less than 72° F.

Section XI—Lunch Rooms

(A) Provisions for Lunching

Either lunch rooms shall be provided or the locker rooms made available for the employees to lunch in when employees are not permitted to lunch at their job as specified in Section IV—(I).

(B) Construction of Lunch Rooms

Where lunch rooms are provided, the walls shall be built not less than eight (8) feet high and they need not be ceiled over if built within high vaulted areas. The walls may be provided with glass.

(C) Equipment

Lunch rooms shall be equipped with sufficient chairs or tables and/or benches to accommodate the number of employees regularly required to lunch at one time.

(D) Temperature of Lunch Rooms

The temperature of lunch rooms during periods of occupancy shall not be less than 68° F.

Section XII—Appendix

See Fig. 1 for an example of the application of the rules for a typical layout of wash, locker, toilet and rest rooms using minimum requirements called for in the code text.

CHAPTER OFFICERS

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Texas Foundries, Inc.
Lufkin, Texas
Vice-Chairman
Texas Chapter

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Crouse-Hinds Co.
Syracuse, N. Y.
Secretary
Central New York Chapter

E. R. Young
Climax Molybdenum Co.
Chicago
Director
Chicago Chapter

D. H. Lucas
Territorial Representative
Chicago
Director
Chicago Chapter

Harry L. Wren
Barada & Page, Inc.
Houston, Texas
Secretary-Treasurer
Texas Chapter

E. P. Trout
Lufkin Foundry & Machine Co.
Lufkin, Texas
Director
Texas Chapter

Jos. S. Schumacher
Cincinnati Milling Machine Co.
Oakley, Cincinnati
Director
Cincinnati Chapter

Robert Latham
Bethlehem Steel Co.
Bethlehem, Pa.
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Michigan City, Ind.
Director
Michiana Chapter

L. L. Andrus
American Foundry Equipment Co.
Mishawaka, Ind.
Secretary-Treasurer
Michiana Chapter

New Association Members

(November 16 to December 15, 1943)

Without doubt, the Chapter Membership Committees this season are doing a splendid job, as shown by the list of 160 members herewith, reported in from November 16 to December 15. The new Texas and Rochester Chapters helped swell the total, with 22 and 16 members, respectively. The California Chapters helped out greatly, the Southern group with 14, the Northern group with 12. In addition, Chicago and Ontario both reported 11 new members. All told, 23 of the 26 chapters added members to their rolls.

CENTRAL INDIANA CHAPTER

***Ertel Machine Co., Indianapolis (John Charles Ertel III, Partner)**

CENTRAL NEW YORK CHAPTER

L. W. Curtis, Foreman, New York Air Brake Co., Watertown, N. Y.
William K. Shanning, Service Engr., Swan Finch Oil Corp., New York, N. Y.

CHESAPEAKE CHAPTER

***R. H. Sheppard Co., Foundry Div., Hanover, Pa. (Joseph J. Peterka, Mgr.)**
Randall J. Thompson, Dist. Mgr., International Forwarding Co., Baltimore, Md.
Chas. A. Walther, Asst. Foreman-Patternmaker, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

CHICAGO CHAPTER

F. Leicester Cuthbert, Research Associate, University of Illinois, Urbana, Ill.
S. M. Goodrich, Mgr., Adjustment Dept., American Steel Foundries, Chicago.
Ralph E. Grim, Petrographer, Illinois Geological Survey, Urbana.
Charles H. Krause, Lab. Tech., Hydro-Blast Corp., Chicago.
W. J. Nobach, President, Weydell-Nobach Co., Chicago.
H. A. Schmidt, Vice Pres., Weydell-Nobach Co., Chicago.
E. I. Schumm, Partner, The Coremakers, Chicago.
Joe R. Urschel, Gen. Mgr., Urschel Laboratories, Inc., Valparaiso, Ind.
Dean Van Order, Industl. Engr., Burnside Steel Foundry Co., Chicago.
Charles W. Vokac, Chief Engr., Hydro-Arc Furnace Corp., La-Grange, Ill.
George L. Warner, Foreman, Metal Pattern Shop, Howard Foundry Co., Chicago.

CINCINNATI DISTRICT CHAPTER

Capt. P. W. Bakarian, A. C., Army Air Forces, Wright Field, Dayton, Ohio.
C. M. Campbell, Oil Chemist, Shepherd Chemical Co., Norwood Ohio.
***Cincinnati Foundry Co., Cincinnati (Geo. A. Euskirchen, Gen Mgr.)**
S. L. Fisher, President, National Brass Mfg. Co., Marysville, Ohio.

DETROIT CHAPTER

Peter M. Alexander, Asst. Foundry Met., Aluminum Co. of America, Detroit.
Douglas A. Davey, Tech. Asst., Aluminum Co. of America, Detroit.
Alfred G. Engelhardt, Sales Repr., Semet-Solvay Co., Detroit.
Paul Guy Maganus, Foundry Quality & Met. Engr., Bohn Aluminum & Brass Corp., Detroit.
M. D. McQuary, Buyer, Chrysler Corp., Detroit.

EASTERN CANADA-NEWFOUNDLAND

***Tweed Foundries, Ltd., Tweed, Ont. (Alfred Hounslow, Supt.)**

METROPOLITAN CHAPTER

Alfred Bornemann, Associate Prof., Stevens Institute of Technology, Hoboken, N. J.
***Croton Chemical Corp., Brooklyn, N. Y. (A. J. Wheaton, Jr., Vice Pres.)**
Harold Lind, Foundry Engr., Beardsley & Piper Co., Cranford, N. J.

MICHIANA CHAPTER

***Strom Brass Foundry, Elkhart, Ind. (Martin J. Lefler, Gen. Mgr.-Partner)**
Harold F. Strom, Partner, Strom Brass Foundry, Elkhart, Ind.

NORTHEASTERN OHIO CHAPTER

Don Burleigh, Plant Supt., Diamond Match Co., Barberton, Ohio.
Paul H. Hodge, Cooper-Bessemer Corp., Grove City, Pa.
Maurice M. Lipnick, Met., Meehanite Metal Corp., Cleveland.
John F. Pritchard, Foreman, Cooper-Bessemer Corp., Grove City.
J. Leonard Uber, Foreman, Cooper-Bessemer Corp, Grove City.
Arch Webster, Core Foreman, Cooper-Bessemer Corp., Grove City.
Clifford T. Williams, Asst. Gen. Mgr., American Crucible Products Co., Lorain, Ohio.

NORTHERN CALIFORNIA CHAPTER

C. W. Chandler, Foreman, Kingwell Bros., Ltd., San Francisco.
Arthur Ciapponi, Prodn. Clerk, General Metals Corp., Oakland.
Kenneth J. Corbin, Foundry Jr. Met., Columbia Steel Co., Pittsburg, Calif.
John D. Darrah, Core Room Foreman, Enterprise Engine & Foundry Co., San Francisco.
Neno Davi, Molder, General Metals Corp., Oakland.
Arthur P. Edwards, Sand Mill Operator, General Metals Corp., Oakland.
Cy S. Humphrey, Maintenance Foreman, General Metals Corp., Oakland.
Darel E. Lingenfelter, Asst. Supt., Navy Plant, General Metals Corp., Oakland.
Robert Montanelli, Coremaker, General Metals Corp., Oakland.
Richard C. Nelson, Melter, General Metals Corp., Oakland.
John R. Russo, Core Room Foreman, General Metals Corp., Oakland.
W. H. Schumann, Supt., Kingwell Bros., Ltd., San Francisco.
Harold A. Young, Asst. Cleaning Room Foreman, General Metals Corp., Oakland.

ONTARIO CHAPTER

***Auto Specialties Mfg. Co. (Canada) Ltd., Windsor, Ont. (W. H. Cantelon, Vice Pres.-Gen. Mgr.)**
Harold Brill, Asst. Foreman, Clare Bros. & Co., Ltd., Preston, Ont.
***Brown Engineering Corp., Toronto. (Geo. R. Traill)**
W. Purdy, Foundry Foreman, Clare Bros. & Co., Ltd., Preston.
***P. E. Shantz Foundry, Preston. (Samuel P. Shantz, Mgr.)**
H. J. Simmons, Supt., General Steel Wares, Ltd., London, Ont.
D. W. Stewart, Jr., Mgr., Light Alloys, Ltd., Renfrew, Ont.
W. Sullivan, Foundry Foreman, General Steel Wares, Ltd., London.
W. E. Sully, Salesman, Sully Brass Foundry, Ltd., Toronto.
***Vivian Engine Works, Ltd., Vancouver, B. C. (F. Bay, Foundry Supt.)**
***Zalev Brothers, Ltd., Windsor. (M. S. Zalev)**

PHILADELPHIA CHAPTER

***Grundy & Svenson, Philadelphia (Frank Grundy, President)**
Clyde B. Jenni, Met., General Steel Castings Corp., Eddystone, Pa.
Lawrence Svenson, Secy., Grundy & Svenson, Philadelphia.

QUAD-CITY CHAPTER

Wayne J. Burke, Sales & Service Dept., Davenport Machine & Foundry Co., Davenport, Iowa.
R. A. Custis, Sales & Service Dept., Davenport Machine & Foundry Co., Davenport.
Carl J. Olson, Service Engr., Iowa-Illinois Gas & Electric Co., Davenport.
Robert E. Shaffer, Instr. in Met., Iowa State College, Ames, Iowa.

ROCHESTER CHAPTER

Ermanno A. Basilio, Chief Met., General Railway Signal Co., Rochester, N. Y.
Robert F. Brown, Foreman, Non-Ferrous Foundry, Josiah Anstice & Co., Inc., Rochester.
J. Roger Collins, Foreman, Core Room, Josiah Anstice & Co., Inc., Rochester.
John L. Collins, Supt., Foundry Div., Josiah Anstice & Co., Inc., Rochester.
Thomas J. Collins, Foreman, Iron Foundry, Josiah Anstice & Co., Inc., Rochester.
Lawrence E. Freehmesser, Foundry Foreman, Ritter Co., Inc., Rochester.
Alfred E. Goater, Foreman, Pattern Shop, American Laundry Machy. Co., Rochester.
Frank O. Houston, Foreman, Iron Foundry, Josiah Anstice & Co., Inc., Rochester.
Ernest W. Kaiser, Foreman, Cleaning Dept., Josiah Anstice & Co., Inc., Rochester.
Harold J. King, Instr., University of Rochester, Rochester.
Howard L. Matthews, Josiah Anstice & Co., Inc., Rochester.
Joseph Pollotta, Asst. Foreman, Josiah Anstice & Co., Inc., Rochester.
***Progressive Foundry Works, Inc., Rochester. (Ernest N. Van Billiard, Vice Pres.-Gen. Mgr.)**
Kenneth R. Proud, Office Mgr., Josiah Anstice & Co., Inc., Rochester.
***Ritter Co., Inc., Rochester. (Charles E. Vaughn, Chief of Lab.)**
Charles T. Wordingham, Foreman-Patternmaker, Ritter Co., Inc., Rochester.

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A. H. Sullivan, Foundry Tech., War Production Board, Clayton, Mo.

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Henry Brutcher, Altadena, Calif.
H. A. Burrow, Owner, H. A. Burrow Pattern Works, Los Angeles.
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Jhan Van Hiel, Works Mgr., Torrance Brass Foundry, Torrance.

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***American Well & Prospecting Co., Corsicana. (Wm. Maxwell, Fdy. Mgr.**
H. C. Brinkman, Partner, Service Pattern & Model Works, Houston.
Chas. L. Buck, Foreman, Service Pattern & Model Works, Houston.
***Dee Brass Foundry, Houston. (Jake Dee, Owner)**

*Company Members.
†Sustaining Members.

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John E. Haw, Hughes Tool Co., Houston.
L. H. Kennon, Sales Repr., Oil City Brass Works, Beaumont.
O. C. Kuehne, Foundry Supt., Alamo Iron Works, San Antonio.
J. Robert McBride, Owner & Mgr., McBride Pattern Works, Houston.
Geo. B. McLanahan, Supt., American Brake Shoe Co., Houston.
Owen Murphy, Partner, Star Foundry Co., Houston.
Stephen S. Przeklasa, Molding Foreman, Dee Brass Foundry, Houston.
T. W. Russell, Partner, Service Pattern & Model Works, Houston.
Reuben Schaefer, Foreman, Wolf Pattern Works, Houston.
James A. Shelley, Plant Supt., Stenzel Pattern Works, Houston.
J. M. Smith, Foundry Foreman, Hughes Tool Co., Houston.
***Stenzel Pattern Works, Houston. (Arthur H. Stenzel, Sole Owner)**
Leroy Geo. Stenzel, Patternmaker, Stenzel Pattern Works, Houston.
†Texas Foundries Inc., Lufkin. (R. S. Bradshaw Jr., Vice Pres.)
Edward W. Wey, Asst. Mgr., Dee Brass Foundry, Houston.
***Wilson Foundry & Machine Co., Houston. (Frank J. Bolman, Foundry Supt.)**
***Wolf Pattern Works, Houston. (Joseph A. Wolf)**

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Robert E. Black, Asst. Supt., Maumee Malleable Castings Co., Toledo, Ohio.
Edward Bossert, Supv., Maumee Malleable Castings Co., Toledo.
Elmer H. Doering, Sales Mgr., Maumee Malleable Castings Co., Toledo.
N. P. Mahoney, Supt., Maumee Malleable Castings Co., Toledo.

TWIN CITY CHAPTER

Charles M. Rollit, N. W. Repr., Federal Foundry Supply Co., Minneapolis.

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Ferris W. Billingsley, Melting Foreman, Sealed Power Corp., Muskegon, Mich.
Donald Lymburner, Foreman, Muskegon Piston Ring Co., Sparta, Mich.
Carl Nequist, Foreman, Muskegon Piston Ring Co., Sparta.
Donald A. Paull, Met., Sealed Power Corp., Muskegon.

WESTERN NEW YORK CHAPTER

Lt. John J. Casey, Materials Lab., Wright Field, Dayton, Ohio.
G. Stomps Gauthier, Mgr., Queen City Foundry & Machine Co., Buffalo, N. Y.
Wm. J. Gibney, Sales Mgr., Bignall Co., Medina, N. Y.
Edward Maishak, Machine Shop Supt., Metal & Alloy Specialties Co., Inc., Buffalo.
Charles C. McArthur, Sales Repr., Swan-Finch Oil Corp., Buffalo.
Edward J. Roesch, Supt., American Brake Shoe Co., Buffalo.

WISCONSIN CHAPTER

Oscar H. Bake, Chief Chemist, Kohler Co., Kohler, Wis.
Joe R. Briesemeister, Grafton Foundry Co., Grafton, Wis.
Fred G. Dashek, Time Study Foreman, Allis-Chalmers Mfg. Co., West Allis, Wis.
***Grafton Foundry Co., Grafton. (Richard J. Golberg, Secy.)**
Joseph Herwaten, Supt., Non-Ferrous Foundry, Kohler Co., Kohler.
Herman W. Mau, Foundry Foreman, Chicago, Milwaukee & St. Paul R. R. Co., Milwaukee.
Roy G. Riesen, Pelton Steel Casting Co., Milwaukee.
Erwin E. Wiese, Foundry Supv., Chicago Ordnance District, Milwaukee.

OUTSIDE OF CHAPTER

Alexander C. Andrew, Asst. Foreman, American Locomotive Co., Schenectady, N. Y.
***Australian Aluminum Co. Pty., Ltd., Sydney, N. S. W., Australia. (N. Warren Waterhouse, Gen. Mgr.)**
Alexander Finlayson, Tech. Dir. & Chief Met., Pacific Car & Foundry Co., Renton, Wash.
A. G. L. Lewis, Mng. Dir., Meehanite Metal Co. (S. A.) Pty., Ltd., Johannesburg, South Africa.
Vicente Martinuz, Master Mech., Shipyard, Mechanical Shop., Bluefields, Nicaragua, Central America.
***Raab, Rochette, Roca & Co., Ltd., Santiago de Chile, Chile, South America.**
John Gowar Ritchie, Met., McPherson's Pty., Ltd., Melbourne, Australia.
Leonard F. Rosier, Mgr., South American Dept., Simmons Machine Tool Corp., Rio De Janeiro, Brazil, South America.
C. L. Thompson, President, Thompson Foundry & Machine Co., Thomasville, Ga.
*** United Engineering & Foundry Co., Canton, Ohio (George M. Biggert, Met., Research Dept.)**
***Western Industrial Supply Co., Portland, Oregon (H. Fischer, President)**

L. M. Long to Battelle

LEIGHTON M. LONG has been named assistant research supervisor at Battelle Memorial Institute, Columbus, Ohio, a position that will give him an opportunity to put his 20 years research and supervisory experience in the metallurgical industries to good use.

Mr. Long has served both as a director of the Toledo Chapter of A.F.A. and as a member of the Non-Ferrous Recommended Practices Committee of the Association.

A.S.T.M. Appoints Sam Tour Representative

THE American Society for Testing Materials has appointed Sam Tour, Sam Tour & Co., Inc., New York City, official representative of A.F.A. Committee B-7 on Light Metals and Alloys, Cast and Wrought, on the Advisory Committee. The appointment was made at the request of the A.F.A. Advisory Committee, Aluminum and Magnesium Div., of which Dr. N. E. Woldman, Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., is chairman.

Mr. Tour is well qualified as A.S.T.M. representative on this committee, having served as a director of the American Foundrymen's Association, participating in the Association's activities for many years.

The appointment of an A.S.T.M. representative on the Advisory Committee of the Aluminum and Magnesium Div. was in the interest of close coordination between that division and the A.S.T.M. in specifications matters. The American Society for Testing Materials is recognized by the American Foundrymen's Association as the specifications making body for the castings industry. A.F.A. is represented officially on all committees and subcommittees of A.S.T.M. dealing with the foundry industry.

Magnesium Book Ready

PUBLICATION of A.F.A. Reprint 43-36 makes available to all interested in magnesium foundry practice a book containing valuable information on the various phases of producing magnesium alloy castings.

The book contains papers presented at recent meetings of the Association, written by men recognized as authorities on this important foundry metal. Within its 148 pages, the book presents the following papers:

Magnesium Foundry Practice, by M. E. Brooks and A. W. Winston, Dow Chemical Co.

Fluoroscopic Examination of Light Alloy Castings, by A. E. Cartwright, Robert Mitchell Co., Ltd.

Temperatures Developed in Sand Cores During the Casting of Magnesium Alloys, by M. V. Chamberlin and A. T. Peters, Dow Chemical Co.

Magnesium Foundry Sand Control, by F. S. Brewster, Dow Chemical Co.

Molding and Core Sand Characteristics in a Light Metal Foundry, by A. V. Lorch, Eclipse Foundry Division, Bendix Aviation Corp.

Magnesium Foundry Sand Control, by M. E. Gantz, American Magnesium Corp.

Sand Practice in a Canadian Light Alloys Foundry, by A. E. Cartwright, Robert Mitchell Co., Ltd.

Chemical Analysis of Sands for Magnesium Castings, by E. M. Cramer, Washington State College Mining Experiment Station.

Core Sand Reclamation at Elevated Temperatures, by D. L. Longueville and O. J. Meyer, Wright Aeronautical Corp.

Thermal Process of Core Sand Reclamation, by W. L. Hartley, Link Belt Co.

Fire Control in Magnesium Foundries, by R. I. Thrune, Dow Chemical Co.

The Control of Magnesium Dust, by John M. Kane, American Air Filter Co.

Health Aspects of Magnesium and Other Foundries, by Warren A. Cook, Division of Industrial Hygiene and Engineering Research, Zurich Insurance Co.

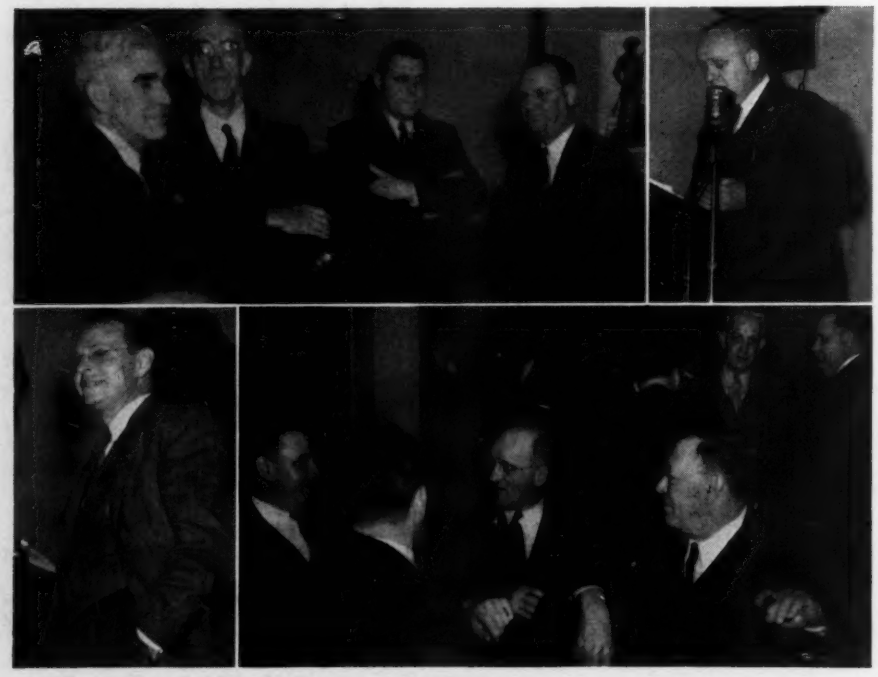
CHAPTER ACTIVITIES News

See page 31 for list of Chapter representatives whose reports of local activities appear in this issue.

Rochester to Hold First Meeting

THE organization meeting of the 26th Chapter of the Association is to be held at Rochester, N. Y., January 6. As announced in November, a meeting sponsored by A.F.A. Past Director Henry B. Hanley, Foundry Manager, American Laundry Machinery Co., Rochester, brought together a group of foundrymen who petitioned for a chapter. When the petition was approved by the A.F.A. Board of Directors, a Nominating Committee was appointed, and it is proposed to hold the election of officers and directors at the January meeting which will be held at the University of Rochester.

Fred G. Sefing, International Nickel Co., Inc., New York City, Chairman, A.F.A. Committee on Cooperation with Engineering Schools, and past chairman, Metropolitan Chapter, will address the meeting on "A Study of Molding Methods for Sound Castings."



(Photos courtesy Geo. T. Kuhn, Gibson & Kirk Co.)

That "man with the camera" at the Chesapeake get-together, October 22, found these personalities particularly photogenic. Top, left—Ed Crown, Washington Navy Yard; R. F. Wood, Corse & Co., Washington; Mike Kelly, Kelco Mfg. Co., Baltimore; John Greenstreet, Maryland Carwheel Co., Baltimore. Top, right—J. S. Vanick, International Nickel Co., New York City. Lower, left—Chapter Chairman R. T. Covington, American Hammered Piston Ring Div., Koppers Co., Baltimore. Lower, right—V. A. Gammon, Landis Tool Co., Waynesboro, Pa.; Don Roemer, Balmar Corp., Baltimore; Ed Cone, American Brake Shoe Co., Baltimore; Fred Roemer, Balmar Corp., Baltimore.

Centrifugal Castings Central Indiana Topic

By Robt. Langsenkamp

THE regular December meeting of Central Indiana Chapter of A.F.A. was held December 6 at Hotel Washington, Indianapolis, with 94 members and guests attending. Subject of the technical meeting was "Centrifugal Casting Methods," the guest speaker being Nathan Janco, Centrifugal Casting Machine Co., Tulsa, Okla.

Mr. Janco discussed the adaptability of the centrifugal casting method to both ferrous and nonferrous castings, illustrating his talk with slides. He stated that such castings may be made in either dry or green sand molds and steel dies. He also explained the three types of centrifugal work.

High Test Iron Topic of New England Group

By M. A. Hosmer

GUEST speaker at the December 8 meeting of the New England Foundrymen's Association, held at the Engineers Club, Boston, was B. A. Miller, Baldwin Locomotive Works, who presented an interesting address on the manufacture of cupola high-test iron. Illustrating his talk with slides, Mr. Miller drew on his broad experience with this type iron in discussing melting practice, pouring temperatures and physical properties.

President A. W. Calder, New England Butt Co., Providence, R. I., presided at the meeting, attended by some 120 members and their friends.

W. Michigan Learns About J.R.T. Program

By C. H. Cousineau

THE November meeting of the Western Michigan Chapter, held November 8 at Hotel Ferry, Grand Haven, Mich., with 70 members and guests attending, featured a discussion of manpower problems. Guest speaker was Ernest Johnson,

Training Within Industry Section, War Manpower Commission, who presented the elements of the Job Relations Training program conducted by the commission in war production plants all over the country.

Primary objects of this intensive 10-hour training program, popularly known as "J.R.T.," for supervisors is to bring him closer to his problems and train him in thinking, in getting and weighing the facts about any employee problem, and in considering how to make fair and just decisions.

Quad City Discusses Foundry Refractories

By H. L. Creps

THE monthly meeting of the Quad City Chapter was held November 15 at Fort Armstrong Hotel, Rock Island, Ill., with 68 members and guests attending. Featured speaker of the evening was Chas. A. Freeman, A. P. Green Fire Brick Co., Mexico, Mo., who pointed out several reasons for the short life of refractories. He illustrated the production of refractories and summarized their testing and specifications.

Vitrification, mechanical breakage, and the reaction of refractories under high temperature were interesting points discussed by the speaker. Mr. Freeman stated that a surprisingly large amount of money is lost annually by firebrick users who, through carelessness, break many bricks while unloading and storing. He also covered various phases of furnace and cupola applications.

Another interesting speaker featured the "coffee talk" — George Magerkurth, one of the best known of National League baseball umpires. Mr. Magerkurth summarized the year's baseball happenings, and related several stories concerning events of the season and some of the big league stars.

Ontario Talks Gates and Risers

By G. L. White

WITH the always interesting subject of "Gates and Risers" for discussion, over 140 members and guests of the Ontario Chapter, the largest group ever present at a regular technical meeting, turned out for the Chapter's October 29 meeting, at Royal York Hotel, Toronto. Following a short motion picture presented through courtesy of Standard Sanitary & Dominion Radiator Ltd., separate discussion groups were held on gray iron, malleable and nonferrous.

Chairman of the gray iron group was Theo. Tafel Jr., Standard Sanitary & Dominion Radiator Ltd., Toronto. Discussion leaders were: A. Mason, Toronto Foundry Co. Ltd.; O. A. Davies of Standard Sanitary, and Peter Gordon, Wartime Merchant Shipping Board.

Mr. Mason outlined some pouring practices, with special reference to gating pulleys and sheaves. Mr. Davies dealt with application of gates and risers to heavy section castings. Consideration also was given the merits of foundry apprentice training programs. Mr. Gordon paid tribute to Canadian foundrymen for their splendid effort on behalf of the Allied cargo ship program, and described difficulties of setting up production schedules early in the war.

Discussion in the malleable group was headed by R. T. Wilson, Ontario Malleable Iron Co. Ltd., Oshawa, Ont. Some of the questions at this session provoked considerable comment, such as the size of feeders and gates. Final answer to this question was that the placing of gates and risers should be decided through trial and error, starting with risers large enough to remove all shrinkage and gradually cutting down to desired size where defects would be removed at different pouring temperatures and analyses.

On the use of chills instead of

(Photos courtesy S. B. Hutchinson, Hutchinson & Sons)

Views of the October 29 Ontario Chapter meeting at Toronto, when the ever-popular "Gates and Risers" subject attracted the largest attendance at any of the group's regular technical meetings.

excessively large risers to remove shrinks, it was stated that risers are definitely superior, providing more natural feeding during the cooling period. Opinions varied on the merits of larger vs. higher feeders in avoiding shrinks at the gate, a majority present agreeing that raising the height of the feeder is superior and, if shrinks still persist, increasing the diameter of the shrink ball.

N. M. Tallman, A. H. Tallman Bronze Co. Ltd., Hamilton, Ont., acted as chairman of the non-ferrous group. Leaders of discussion included D. Sunnucks, Aluminum Co. of Canada Ltd., on aluminum and magnesium; G. Hewitt and W. Jones, Canadian Westinghouse Co. Ltd., on brass and bronze; and Jos. Sully, Sully Brass Foundry Ltd., on aluminum-bronze.

Mr. Sunnucks outlined the use of gating in promoting progressive solidification, and of chills in increasing the rate of solidification. Messrs. Hewitt and Jones dealt mainly with the production of the main body of a torpedo engine in bronzes, including phosphor bronze, silicon bronze, and "A" bronze. Modifications of gating and risering were brought out in efforts to reduce scrap.

Aluminum-bronze castings for gun mounts were discussed by Mr. Sully, best results having been achieved by use of single horn gates with the flange up, and two risers. Discussion followed on various types of test bars for non-ferrous metals.

Non-Ferrous Alloys at Northern California

By G. L. Kennard

THE regular meeting of the Chapter was held at the Leamington Hotel, Oakland, November 12, 1943, with Chapter President Harry A. Bossi, H. C. Macauley Foundry Co., Berkeley, presiding.

Dinner was served to 81 members and guests. The usual plan of personal introduction was followed after which Mr. Bossi covered the Chapter's financial standing to date, its membership increase and prospects.

Mr. Bossi announced that no meeting would be held in December. He also mentioned the organization of a Committee on Foundry Sands and Mold Materials with a total of 19 members. Secretary Kennard stated that they would soon hold their first meeting to organize their plan of operation.

David B. Reeder, Electrometallurgical Co., program chairman, then introduced D. C. Caudron, Pacific Brass Foundry, and F. L. DeSanno, DeSanno Foundry and Machine Shop, as guest speakers. Mr. Caudron very thoroughly covered the casting of manganese and silicon bronzes and monel metal, from his 20 years' experience. His talk led to interesting questions, most of which he answered. Mr. DeSanno had prepared a series of charts on the casting of red brasses, featuring the difficulties encountered in meeting U. S. Navy requirements and how he had overcome them.

Both these local men were complimented on the manner and presentation of their subjects. Before the meeting closed, three new members were reported.

Central N. Y. Hears Vanick on Cast Irons

By E. G. White

THE November 12 meeting of the Central New York Chapter, held at the Onondaga Hotel, Syracuse, N. Y., was a joint affair with the Syracuse Chapter of American Society of Metals. As a result the turnout was unusually large.

J. S. Vanick, International Nickel Co., New York, presented an excellent guest talk on the heat treatment of cast ferrous metals. Illustrating his subject with photomicrographs showing structures of metals, Mr. Vanick developed the point that heat treatment of gray iron is essentially the same as for cast steel, the major difference in the final product being due to the graphite in the iron.

Annual Round Table Is Chesapeake Attraction

By Geo. F. Kuhn

CHESAPEAKE Chapter held one of its most interesting meetings of the year December 3 at the Engineer's Club, Baltimore, the occasion being the chapter's Annual Round Table Conference. Technical Secretary David Tamor, American Chain & Cable Co., Inc., York, Pa., pre-

The official organization meeting of the Texas group, held November 26 at Houston, bringing the Association family to a total of 25 chapters.

sided over the technical program.

Three informal discussion groups held separate meetings, on steel, cast iron and bronze. The steel group was headed by J. E. Crown, U. S. Navy Yard, Washington, D. C., past Chairman of the chapter and a National Director of A.F.A. C. C. Adams, Bethlehem Steel Co., Bethlehem, Pa., headed the cast iron discussions and Mr. Tamor acted as chairman of the bronze group.

Preceding the question period in the bronze meeting, Mr. Tamor reviewed important technical contributions in casting this non-ferrous material, illustrating with slides the physical properties of ounce metal resulting from various pouring temperatures. Some important information on causes of gassed metal was offered by Herman Smith, Federated Metals Div., American Smelting and Refining Co.

N. Illinois-S. Wisconsin Annual Christmas Party

By R. W. Mattison

ATTENDANCE at the Annual Christmas Dinner Party of the Northern Illinois and Southern Wisconsin Chapter, held December 4 at the Faust Hotel, Rockford, Ill., far surpassed attendance of any previous holiday affair and set a new record. Over 430 members, wives and guests attended, enjoyed a splendid family style dinner, and an excellent show arranged by the Entertainment Committee.

S. California Hears Pattern, Testing Talks

By B. O. Bender

ANOTHER smashing attendance record was chalked up at the Southern California Chapter meeting on November 19 when over 230 members and friends enjoyed an evening of instruction and fellowship.

"Patterns—Past, Present and Future" were discussed by Earl D. Shomaker, Kay Brunner Steel Products Co. A timely talk on inspection and testing of iron, steel and brass castings was made by Comm. J. C. Arnold, of the Los Angeles office, Inspector of Naval Material.

A number of other Naval officers from the Naval inspection department attended the meeting, including: Lt. Comm. Frome, Progressing and Expediting Division; Lt. Comm. Willis and Lt. Johnson, Inspection Division; Lt. Murray, Labor Relations, 11th Naval District; Lt. Schwartz, Incentive Office; Paul Brown, Chief Inspector, Naval Materials; and Clarence Ake and Ben Clemens, Supervisors of Inspection for the Navy department.

Additional war atmosphere was given the meeting by a showing of movies from the South Pacific and European theaters of war, illustrating to all foundrymen the actual use of their castings.

Wisconsin Chapter Plans Seventh Annual Conference

THE Seventh Annual Conference of the Wisconsin Chapter, A.F.A., will be held February 10 and 11, 1944, in the Hotel Schroeder, Milwaukee. Harry E. Ladwig, Chairman, and William A. Hambley, Co-Chairman, both of Allis-Chalmers Mfg. Co., are arranging another interesting conference at which present problems and post-war planning will be discussed by leading speakers from all over the country.

The opening session will be addressed by F. E. Johnson, College of Engineering, University of Wisconsin, and Dean Holt, who will speak on "The University's Function in Training Men for Industry." Six hundred members and guests will attend this noon luncheon session Thursday, February 10.

Following the keynote address, five different sectional divisions, gray iron, steel, non-ferrous, malleable and pattern, will swing into their opening meetings to tackle such problems as heat treatments, centrifugal castings, core blowing, etc. A new division on management and engineering, created for this Conference, will deal with special problems, such as "Held and Cancellation of Government Contracts," safety and health problems. Its opening session will be addressed by Dr. Paul Brehm, Supervisor, Wisconsin State Board of Health, who will talk on "Health in Industry from the Management Viewpoint."

Climaxing the events of the opening day, Dr. Clarence Dykstra, President, University of Wisconsin, Madison, one of today's outstanding and authoritative speakers on current events, will address the membership at the annual evening dinner. Dr. Dykstra is former City Manager of Cincinnati and was the first Director of Selective Service. He recently was appointed Commander, Citizen's Service Corps, Wisconsin State Council of Defense.

John H. Van Deventer, New York, President and Editor, *The Iron Age*, will speak at the noon

Officers and Directors elected at organization meeting of New Texas Chapter at Houston, November 26. Left to Right Upper Row—Harry L. Wren, Billy Bryant, Jake Dee, L. H. August, Ed Trout. (Front Row)—J. Klein, T. W. Russell, F. M. Wittlinger, R. E. McArdle, A. S. Cramer. Directors W. A. Raymond and H. F. Elmer, not shown.

(Photos courtesy Clyde Thomas, Whiting Corp.)

Three speakers contributed to the "Inspection of Castings Through Non-Destructive Methods" subject at the Chicago Chapter's December 6th meeting at the Chicago Bar Association Restaurant.

luncheon on the second day of the Conference, February 11. Mr. Van Deventer has engaged in manufacturing work in addition to the field of publishing and editing. He assisted in the organization of the United States Ordnance Department in the last war and has been closely associated with the automobile industry as observer of its technical and economic aspects for the past 25 years. He has been with *The Iron Age* since 1930.

A total of 30 technical sessions will be held under the leadership of Chairman Ladwig, Co-Chairman Hambley and the direct assistance of Chapter President George K. Dreher, Ampco Metal, Inc.; Prof. J. F. Oesterle, Prof. R. E. Shorey, both of the University of Wisconsin, Madison; John Bing, A. P. Green Firebrick Co.; Dave Zuege, Sivyer Steel Casting Co.; Frank Waldenmeyer, Lakeside Malleable Casting Co.; Charles Fuerst, Falk Corp.; B. D. Claffey, General Malleable Corp.; E. B. Hansen, Wisconsin-Appleton Co.; George Smitka, Ampco Metal, Inc.; and C. W. Morisette, Marquette University.

Texas Foundries Organize 25th Chapter

FORMAL organization of the 25th Chapter of the A.F.A. took place at Houston, Texas, on November 26, when some 90 foundrymen met at the Houston Country Club. In organizing, a Nominating Committee presented the following candidates for election as chapter officers and directors:

Chairman—F. M. Wittlinger, Texas Electric Steel Castings Co., Houston.

Vice-Chairman—J. O. Klein, Texas Foundries, Inc., Lufkin.

Secretary-Treasurer—Harry L. Wren, Barada & Page, Inc., Houston.

DIRECTORS

To Serve One Year

W. A. Raymond, Houston Foundry & Machine Company, Houston.
Oscar Kuehne, Alamo Iron Works, San Antonio.
A. S. Cramer, Dickson Gun Plant, Houston.
T. Killman, Texas Steel Co., Forth Worth.

To Serve Two Years

L. H. August, Hughes Tool Co., Houston.
H. L. Roberts, Oil City Brass Works, Corsicana.
George E. Bryant, Oil City Brass Works, Beaumont.
R. H. McArdle, McArdle Equipment Co., Houston.

To Serve Three Years

T. J. Russell, Service Pattern & Model Works, Houston.
H. F. Elmer, Dedman Foundry & Machine Co., Houston.
J. Dee, Dee Brass Foundry, Houston.
Ed Trout, Lufkin Foundry & Machine Company, Lufkin.

These officers and directors were elected unanimously and Mr. Wittlinger, as Chairman, announced the appointment of the following committees and their chairmen:

Membership Committee—F. G. Huber, Gen. Mgr., Able Supply Co., Houston, *Chairman.*

By-Laws Committee — Walter E. Hockmuth, Houston Foundry & Machine Co., Houston, *Chairman.*

Entertainment Committee — R. E. McArdle, McArdle Equipment Co., Houston, *Chairman.*

After announcement of plans for future meetings, Chairman Wittlinger introduced Harry W. Dietert, Harry W. Dietert Co., Detroit, as the speaker. Mr. Dietert before giving his address stated it was a pleasure as Past Chairman, Detroit Chapter, and a native Texan to present to the youngest chapter of the Association a gavel. This gavel of cast iron was first presented to the Association several years ago by the Chicago Chapter and has been passed from chapter to chapter as the new chapters are organized.

Mr. Dietert then discussed "The Fundamentals of Sand Control" and showed some motion pictures of sands being tested in high temperature furnaces.

5th Annual Xmas Party of Cincinnati District

By M. F. Milligan

SOME 500 members of the Cincinnati District Chapter, together with their wives and friends, gathered at the Netherland Plaza Hotel, Cincinnati, on December 11 for the Chapter's 5th Annual Christmas Party. The evening of fellowship, dinner and entertainment was voted one of the finest ever held, a brief but welcome interlude of relaxation.

St. Louis Gives Night to Discussion Groups

By J. H. Williamson

MEETING at the DeSoto Hotel, St. Louis, Armistice night, the St. Louis District Chapter held a series of round-table meetings which, appropriately, brought out considerable discussion on castings for war production. The evening was presided over by Chapter Chairman L. A. Kleber, General Steel Casting Corp., Granite City, Ill., and began with 30 minutes of war movies.

Three discussion groups were held separately, on steel, gray iron and non-ferrous problems,

and were conducted by the following, all of St. Louis:

Steel: Chairman, S. H. Shields, Walworth Co., St. Louis; Discussion Leader, J. D. Walsh, Scullin Steel Co., St. Louis.

Gray Iron: Chairman, Herman Harte, Fulton Iron Works Co., St. Louis; Discussion Leader, Walter E. Illig, Banner Iron Works, St. Louis.

Non-Ferrous: Chairman, Jas. Gilbert, Gilbert Brass Foundry Co., St. Louis; Discussion Leader, J. R. Bodine, Bodine Pattern & Foundry Co., St. Louis.

Michiana Discusses Patterns

L. F. TUCKER, City Pattern Works, South Bend, Ind., a director of the Michiana Chapter, was the speaker before the December 7 meeting of his chapter. The chapter held its dinner at the LaSalle Hotel, South Bend, with Chapter Chairman J. E. Drain, Oliver Farm Equipment Co., presiding.

Mr. Tucker gave a most valuable talk on "Cooperation of the Jobbing Pattern Shop with the Foundry," and showed what could be done if the pattern shop and foundry worked together in planning pattern equipment. In concluding his presentation, Mr. Tucker showed the patterns made in the 1942 A.F.A. Apprentice Contest and reviewed the advantages and disadvantages of the various ideas incorporated by the different contestants in making their patterns. All present felt that the speaker brought out ideas which could be applied in their own practice. The chapter is to be congratulated on using its own talent for discussion leaders.

N.E.O. Observes Nov. 11 with a "Service Nite"

By W. G. Gude

NEARLY 200 members and guests participated in a highly appropriate Armistice program of the Northeastern Ohio Chapter at which Chapter President James G. Goldie, Cleveland Trade School presided. The Armed Services were very much in evidence both at the dinner table and at the technical program.

Dinner guests included representatives of the Army, Navy, Air Corps, Wacs, Waves, Spars, Marines and even the coffee talk was given by a veteran of Pearl Harbor, crew member of the *"Lexington,"* Machinist's Mate W. D. Thornton, U.S.N., who gave a vivid description of his experiences in the Pacific as well as in the allies' African invasion a year ago.

Guest speaker at the technical session was Lt. Col. T. H. Eickhoff, Cleveland Ordnance District, who was introduced by Chapter Vice-President R. F. Lincoln, Osburn Mfg. Co. Col. Eickhoff, in discussing ordnance work in the foundry industry, urged selection of the best casting for each particular job. He also recommended closer cooperation between the various elements which comprise the casting industry.

While he held out some hope for some solution of foundry labor problems by the Government he emphasized how management can help itself through improved working conditions and employer-employee relations.

Detroit Features Round Tables

By A. H. Allen

CONTINUING the attendance record of practically all its meetings last season, the Detroit Chapter of A.F.A. drew 118 members and guests for the dinner and round-table meeting November 18, at the Rackham Memorial. This turnout nearly equaled the October meeting attendance of 129.

Four round-table sessions were presented, on steel, malleable iron, manganese and aluminum bronzes, and x-ray applications in aluminum foundries. Discussion of melting problems in steel foundries was directed by John McBroom, Hydro-Arc Furnace Corp., Chicago, with C. E. Silver, Michigan Steel Casting Co., acting as chairman. Relative positions of cupola, open-hearth and electric furnace steel in the foundry developed lively discussion.

H. W. Dietert, Harry W. Dietert Co., detailed some recent developments in molding sands and molding materials, in the malleable iron group. Chairman of this session was G. L. Galmish, Michigan Malleable Iron Co.

The group discussing manganese and aluminum bronzes heard G. P. Halliwell, H. Kramer &

Reporters on Chapter Activities

Officers and representatives of A.F.A. chapter and other foundry groups who report on local activities in this issue, are identified below:

Central Indiana—Robt. Langsenkamp, Langsenkamp-Wheeler Brass Works, Inc., Indianapolis; Chapter Secretary.

Central New York—E. G. White, Crouse-Hinds Co., Syracuse, N. Y.; Chapter Secretary.

Chesapeake—Geo. F. Kuhn, Gibson & Kirk Co., Baltimore, Md.; Chapter Reporter.

Cincinnati District—M. F. Milligan, The Lunkenheimer Co., Cincinnati; Chapter Secretary.

Detroit—A. H. Allen, Penton Publishing Co., Detroit; Chapter Secretary.

Eastern Canada & Newfoundland—W. J. Brown, Robert W. Bartram, Ltd., Montreal; Chapter Vice-Chairman, Publicity Committee.

New England Foundrymen's Association—Merton A. Hosmer, Hunt-Spiller Mfg. Corp., Boston; Group Reporter.

Northeastern Ohio—W. G. Gude, *"The Foundry,"* Cleveland; Chapter Reporter.

Northern California—Geo. L. Kennard, Northern California Foundrymen's Institute, San Francisco; Chapter Secretary-Treasurer.

Northern Illinois-Southern Wisconsin—R. W. Mattison, Mattison Machine Works, Rockford, Ill.; Chapter Vice-Chairman.

Ontario—G. L. White, Westman Publications Ltd., Toronto; Chapter Secretary-Treasurer.

Quad City—H. L. Creps, Frank Foundries Corp., Moline, Ill.; Chapter Secretary-Treasurer.

St. Louis District—J. H. Williamson, M. A. Bell Co., St. Louis; Chapter Secretary-Treasurer.

Southern California—Blaine O. Bender, Advance Aluminum & Brass Co., Los Angeles; Chapter Publicity Secretary.

Western Michigan—C. H. Cousineau, West Michigan Steel Foundry Co., Muskegon, Mich.; Chapter Secretary.

Co., Chicago, comment on microstructures, cooling rates and other metallurgical data, the talk being illustrated with slides. E. R. Darby, Federated-Mogul Corp., headed this discussion group. Leading all the other sessions in point of attendance was the aluminum round-table with A. W. Stolzenburg, Aluminum Co. of America, as chairman. At this meeting H. J. Brandt of the Aluminum company analyzed typical defects in aluminum castings as revealed by the x-ray, and other corrective measures.

Chicago Discusses Non-Destructive Inspection

A SUBJECT brought to the fore by war production work, "Inspection of Castings Through Non-Destructive Methods," proved a fine drawing card for the December 6 meeting of the Chicago Chapter, held at the Chicago Bar Association Restaurant. Three separate speakers, all with broad practical experience in testing techniques, presented various phases of the subject.

E. Leverenz, chief inspector, American Steel Foundries, East Chicago, Ind., spoke on "Magnafluxing of Steel Castings," and E. L. LaGrelius, supervising metallurgist of American Steel, discussed "Radiography of Steel Castings," in which he has done considerable work.

The third speaker, G. A. Lillieqvist, research director for American Steel, led the discussion on non-destructive methods of inspection, answering numerous questions that showed the interest of the large attendance. Chapter Vice-Chairman A. S. Klopf, Hansell-Elcock Co., presided and as Chairman of the Program Committee introduced the speakers.

Metropolitan Repeats Lecture Course

A COURSE of 24 lectures on the fundamentals of foundry engineering again is being offered at the Stevens War Industries Training School, Hoboken, N. J., beginning January 6, in cooperation with the Metropolitan Chapter of A.F.A. Sponsored by the U. S. Office of Education, the course is being repeated following the successful experience of last year, when over 100 plant representatives attended.

Sessions of the course, shown elsewhere on this page, will run from January 6 through March 24. They will be given at the Stevens Institute of Technology and are offered tuition free to men from interested companies. The program was formulated to assist foundrymen, design engineers, x-ray technicians and others to broaden their over-all knowledge of castings operations, in furthering foundry war production work.

The lecture course was originated through the efforts of T. D. Parker, Climax Molybdenum Co., New York, and Chairman of the A.F.A. Committee on Cooperation with Engineering Schools. The Metropolitan Chapter worked closely with the school in formulating the 1943 course, as it did this year under the leadership of Chapter Chairman John W. Reid, R. Hoe & Co., Dunellen, N. J.

Cincinnati Men Take Up Refractories Problem

By M. F. Milligan

SOME 70 members and guests of the Cincinnati District Chapter met November 8 at the Cincinnati Club, Cincinnati, for a discussion of foundry refractories. Chapter Vice-Chairman W. A. Rengering, Cincinnati Milling Machine Co., presided in the absence of Chairman King.

Two guest speakers featured the technical program. C. E.

1944 Metropolitan Lecture Course Schedule

Jan. 6, 7—*Solidification and Cooling Phenomena.*
W. C. Schulte, Curtiss Propeller Div., Curtiss-Wright Corp., Caldwell, N. J.

Jan. 13—*Casting Design.*
R. E. Ward, Eclipse-Pioneer Div., Bendix Aviation Corp., Bendix, N. J.

Jan. 14, 20—*Pattern Design.*
Geo. Corey, Jr., R. Hoe & Co.

Jan. 21, 27—*Gating and Risering.*
H. F. Taylor, Naval Research Laboratories, Washington, D. C.

Jan. 28, Feb. 3—*Molding Methods for Sound Castings.*
F. G. Sefing, International Nickel Co., New York.

Feb. 4—*Molding and Core Sand.*
C. B. Somers, Whitehead Bros. Co.

Feb. 10, 11—*Sand Testing and Sand Binders.*
G. F. Watson, American Brake Shoe Co., Mahwah, N. J.

Feb. 17—*Effect of Sand and Facings on Castings.*
W. Rose, Wright Aeronautical Corp.

Feb. 18, 24—*Permanent Mold and Die Castings.*
A. Sugar, U. S. Metals Refining Co., New York.

Feb. 25—*Melting and Pouring Cast Iron.*
J. A. Bukowski, Worthington Pump & Machinery Corp., Harrison, N. J.

March 2—*Melting and Pouring Cast Steel.*
E. V. Roberts, American Steel Castings Co., Newark, N. J.

March 3—*Melting and Pouring Bronze.*
W. E. Paulson, Thomas Paulson & Son, Inc., Brooklyn, N. Y.

March 9—*Melting and Pouring Aluminum and Magnesium.*
A. MacIntosh, Wright Aeronautical Corp., Paterson, N. J.

March 10—*Cleaning of Castings.*
F. Mosley, Whitehead Bros. Co.

March 16—*Annealing and Heat Treatment.*
Ferrous Alloys: J. S. Vanick, International Nickel Co., New York.
Non-Ferrous Alloys: R. E. Ward, Bendix Aviation Corp.

March 17—*X-Ray, Gamma Ray, Magnaflux and Zyglo Inspection Methods.*
A Gobus, Sam Tour & Co. Inc., New York.

March 23—*Foundry Costs.*
John L. Carter, Gray Iron Founders Society, Newark, N. J.

March 24—*Foundry Control.*
F. G. Sefing, International Nickel Co.

Bales, Ironton Fire Brick Co., Ironton, Ohio, spoke on "New Developments for Foundry Refractories." This talk was presented before the ferrous group.

A separate talk was presented before the non-ferrous group by M. H. Berns, Electro Refractories and Alloys Corp., Buffalo, N. Y. Mr. Berns gave an interesting address on "Refractories for Non-Ferrous Foundries."

Both speakers discussed the proper application and use of special refractories with emphasis on service life, and both offered a short description of modern manufacturing methods. A lively discussion followed the talks.

During the evening Chapter Secretary Martin F. Milligan, The Lunkenheimer Co., Cincinnati, announced the resignation of Chapter Director David L. Longeuville, Wright Aeronautical Corp., Cincinnati, due to his transfer from the city. The members of the chapter all expressed regret at Dave's leaving.

Eastern Canada Discusses Cores

By W. J. Brown

ATTENDANCE cards for the November 19 meeting of the Eastern Canada and Newfoundland Chapter showed that 106 members and guests were present. Chapter Chairman E. N. Delahunt, Warden King, Ltd., Montreal, presided and made the interesting announcement that membership of the chapter, organized as recently as 1942, has now passed the 230 mark.

Mr. Delahunt also reported that the chapter Apprentice Committee, under chairmanship of W. G. E. Burgess, Jenkins Bros., Ltd., Montreal, had made arrangements for apprentices to visit local plants so as to observe foundry practice outside their own shops. Hector Beaupre, director of the Montreal Technical School, offered the facilities of the school in furthering local apprentice instructions.

The Chairman introduced L. P. Robinson, Werner G. Smith Co., Cleveland, as the guest speaker, who called on his many years of experience with core room practices for his talk on "Variables for the Core Room."

Schedule of January Chapter Meetings

January 3

Chicago
Chicago Bar Assn. Restaurant
ROUND-TABLE MEETINGS
Steel—"Substitute Materials."
Non-Ferrous—"Uses and Abuses of Non-Ferrous Foundry Sands."
Gray Iron & Patternmaking—Joint meeting.

✦

Metropolitan
Essex House, Newark, N. J.
B. A. MILLER
Baldwin Locomotive Works
"Copper Base Alloys"

✦

Central Indiana
Athenaeum, Indianapolis
LEIGHTON LONG
Battelle Memorial Institute
"Meeting Brass and Bronze in the Cupola"

✦ ✦

January 4

Michiana
La Salle Hotel, South Bend, Ind.
J. WITTNER
"Job Evaluation"

✦ ✦

January 6

Rochester
University of Rochester
ORGANIZATION MEETING
F. G. SEFING
International Nickel Co.
"A Study of Molding Methods for Sound Castings"

✦ ✦

January 8

Central Indiana
Athenaeum, Indianapolis
ANNUAL HOLIDAY PARTY

✦ ✦

January 10

Western Michigan
Hotel Ferry, Grand Haven, Mich.
F. A. MELMOTH
Detroit Steel Casting Co.
"Cooperation and the Human Equation in Foundries"

✦

Cincinnati District
Cincinnati Club
F. G. SEFING
International Nickel Co.
"A Study of Molding Methods for Sound Castings"

January 13

Northern Illinois-Southern Wisconsin
Hotel Faust, Rockford, Ill.
L. P. ROBINSON
WERNER G. SMITH
"Core & Core Oil"

✦

Northeastern Ohio
Cleveland Club, Cleveland
T. E. BARLOW
Vanadium Corp. of America
"Alloy Inoculations"

✦

St. Louis
DeSoto Hotel, St. Louis
JAS. A. MURPHY
Jas. A. Murphy & Co.
"Compressed Air Troubles & Remedies"

✦ ✦

January 14

Wisconsin
Schroeder Hotel, Milwaukee
ROUND-TABLE MEETINGS

✦

Central New York
Onondaga Hotel, Syracuse
W. A. HAMBLEY
Allis-Chalmers Mfg. Co.
"Defective Castings"

✦

Northern California
Engineering Club, San Francisco
JOHN R. GREGORY
Geneva Steel Co.
"To Each Other"

✦

Philadelphia
Engineers Club
PAT DWYER
"The Foundry"
"What Do You Know About Gates?"

✦

Texas
Houston Country Club, Houston

✦ ✦

January 17

Quad City
(Joint Meeting with A.S.M.)
Ft. Armstrong Hotel, Rock Island, Ill.
V. A. CROSBY
Climax Molybdenum Co.
"New Developments and Heat Treating of Cast Iron"

January 20

Detroit
Rackham Educational Memorial
M. J. GREGORY
Caterpillar Tractor Co.
"Core Blowing Techniques"
RALPH R. LEE
General Motors Corp.
"Leadership and What It Takes"

✦ ✦

January 21

Eastern Canada and Newfoundland
Mt. Royal Hotel, Montreal
JACK CONNELLY
Pangborn Corp.
"Cleaning Castings"

✦ ✦

January 22

Western New York
Elks Club, Buffalo
ANNUAL STAG PARTY

✦ ✦

January 25

Toledo
Waldorf Hotel, Toledo
STEEL NIGHT

✦ ✦

January 27

(Tentative)
Canton, Ohio

✦

Twin City
Midway Club, St. Paul
GEORGE K. DREHER
Ampco Metal, Inc.
"Heavy Non-Ferrous Castings"

✦ ✦

January 28

Chesapeake
Engineers Club, Baltimore, Md.
H. F. TAYLOR
Naval Research Laboratories
"New Technique in Gating, Risering"

✦

Ontario
Royal Connaught Hotel, Hamilton
E. E. WOODLIFF
Foundry Sand Service Engineering Co.
"Applied Sand Control"

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